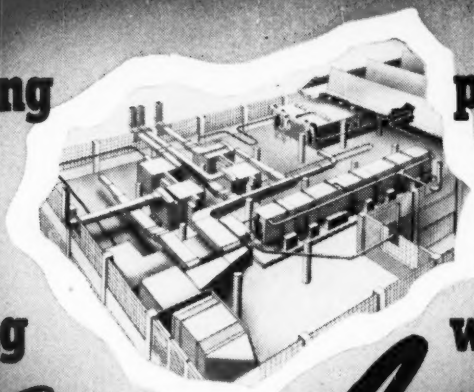
Products Finishing

CLEANING
PLATING
POLISHING
FINISHING

MAY 1950

spray painting

rust proofing



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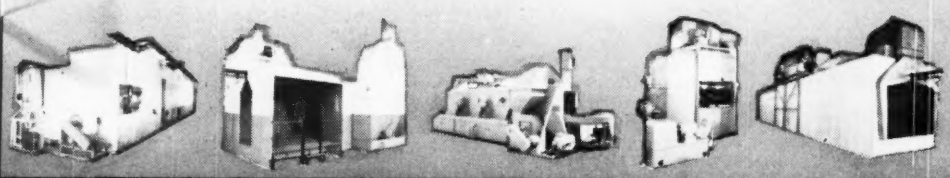

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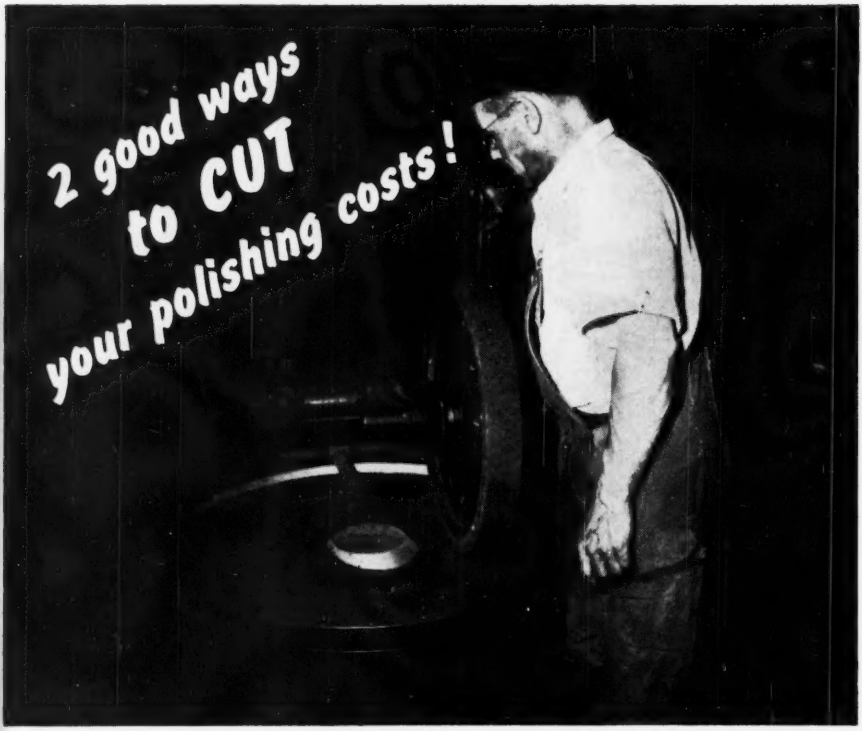

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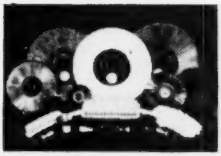

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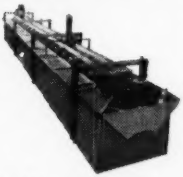

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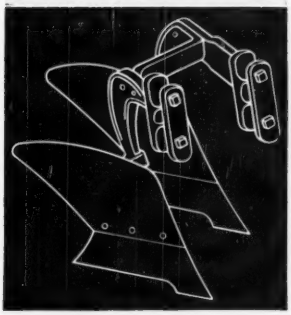

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pf editorial

Vol. 14, No. 8

MAY, 1950

The Finishing Foreman

Perhaps one of our less desirable American characteristics is our readiness to "Let George Do It." And yet the fact that continues to amaze our friends, and confuse and confound our enemies is that, in almost every case, "George" gets it done.

In the finishing department or the finishing shop, a very important "George" is the Finishing Foreman. His interests, activities and worries extend all the way from the basic material given him to work with, to the final inspection or field service reports concerning the products that have been processed through his department. He must concern himself about base metal condition, weld soundness, metal surface soil, operation of his cleaning equipment, efficiency and proper operation of the cleaning materials used, efficient operation and adequate maintenance of all other finishing equipment, proper application of the finishing materials to meet specifications and produce a finish acceptable to the inspectors, and the production of a sufficient number of units per day to satisfy shop management.

The Finishing Foreman must take the skilled or unskilled operators presented to him by the personnel department and weld them into an efficient producing team. He must listen to their complaints, laugh at their jokes, turn his back at the proper times, and at the same time insist in a fair, firm, and friendly manner that standards of quality be maintained and that production quotas be met. He must also be able to cooperate effectively with other foremen in the best interests of all concerned.

The duties and responsibilities to which the Finishing Foreman falls heir could be discussed at great length. The results of his efforts can, however, be boiled down to just five words, "He gets the job done."

Ezra A. Blount

Proper Paint Storage Can Aid Production

By GILBERT C. CLOSE

IT IS true that paint storage departments are not regarded as an operating unit of the production line, but when storage and handling are accomplished in a manner that facilitates production, they certainly deserve true recognition in the production picture.

This fact is well emphasized at the El Segundo plant of the Douglas Aircraft Company where paint storage and handling are so integrated with production that it is impossible to draw a sharp line between the two.

The value of close association between paint storage and actual production painting has long been recognized, but very few companies have availed themselves of this advantage to the extent in evidence at the Douglas El Segundo plant.

A single building, an interior view of which is shown in Fig. 1, is used for storing all paints, chemical and upholstery products, bottled or dry chemicals used in processing or heat treating of metals, dopes, and so on. Each product is stored in a manner to facilitate rapid delivery to the production line in a condition ready for use.

Another feature of the storage building is the elaborate measures taken to insure safety in all operations. This includes not only safety to personnel, but safety in assuring that all stores will be delivered to the production line in an uncontaminated condition.

Thinners that are used in large quantities are stored in underground tanks and pumped into the building through electrically controlled metering devices. This method insures a high degree of safety and facilitates cleanliness and accuracy. Small issues of thinner may be drawn from each tank through convenient outlets. A minimum of time is required to draw either one quart or fifty gallons of thinner, just as production requires it. Thinners required for actual paint or lacquer thinning are piped directly to the main mixing tanks, shown in Fig. 2.

There are eleven of these mixing tanks, each of 120 gallons capacity. Three of the tanks are used for mixing zinc chromate primer, four for mixing lacquer, and four for mixing dope. Thus by specializing the use of each tank

and connecting it to the proper thinner tank, all chance of error is eliminated and the problem of tank cleaning is greatly reduced.

The tanks agitate constantly to make sure that when contents are withdrawn for use in production, uniform materials are obtained. Strict cleanliness plus proper mixing eliminate most of the trouble that occurs with spraying equipment. Here again is an instance where production finishing is facilitated.

Outlets at the bottoms of the main mixing tanks permit pouring of the contents directly into safety cans. These cans are then sealed and delivered to the various spray booths along the production line. There is no chance for contamination along the way.

Colors in smaller batches are kept agitated in 50 gallon barrels. These barrels, fitted with protective rings, are mounted on a series of powered rollers which provide constant rotation. A steel frame rack holds 54 barrels of various oils and thinners for withdrawal in smaller amounts. The rack is so constructed that barrels may be removed or replaced independently.

The paint storage building is isolated some distance from the main factory buildings. Travel between the buildings by production personnel would consume considerable time. To eliminate this loss, a scheduled system of delivery has been established.

Orders for paint or allied stock are phoned directly to the stockroom, and requested materials are delivered hourly according to this pre-arranged schedule. Deliveries are made by means of a powered tug and trailers. To increase safety by eliminating static electricity which might ignite the highly flammable thinners, the trailers are bonded together and grounded.

Violently poisonous or hazardous chemicals are stored in a specially constructed and isolated section of the warehouse. This section is composed of a series of vaults opening into a central aisle, a view of which is shown in Fig. 3. The vaults are constructed

Fig. 1—A view of the paint storage building interior, showing the main storage room for bulk liquids and dry ingredients. The pallet system is utilized for handling. Overhead crane permits movement of containers the full length of building. Storage arrangement is made so all material is accessible for first-in, first-out basis issuance.

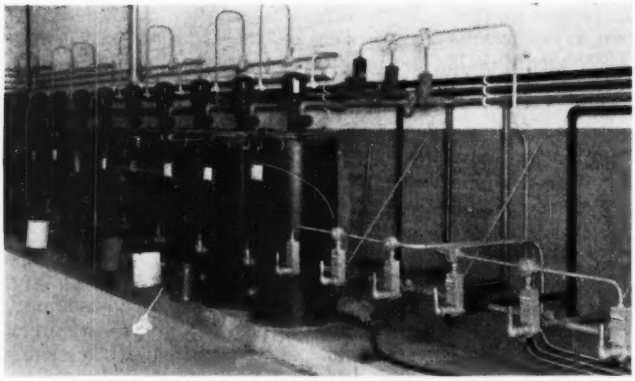

Fig. 2—Underground thinner storage tanks are directly connected to these Binks 120-gallon mixing units located in the paint storage mixing room. Flow of liquids is regulated by electrically controlled metering devices, eliminating spoilage through use of incorrect thinners. Constantly agitated, these units assure a properly mixed formula which is easily dispensed from bottom outlets into delivery containers.

of brick and concrete. and are kept locked at all times. All issuances from these stores must be made under the direction of supervisory personnel.

Though each vault is open to the aisle, each door is constructed with a 6-inch sill to prevent running and intermingling of the chemicals in the event of excessive spillage. In actuality, this sill makes the floor of each vault like a 6-inch deep cement and brick tank from which spilled liquids cannot escape.

Nitric, acetic, sulfuric, hydrochloric, chromic, and hydrofluoric acids are stored in separate vaults. As a double safety measure, the poisonous cyanides used in heat treating and in various metal plating processes are locked in a vault within a vault.

An established control provides both uniformity and safety in the distribution and use of the more hazardous and poisonous chemicals. Special handling does not end within the protected stockroom areas. There is no relaxing of this rigid control until the products have been delivered and the empty containers returned to the warehouse, the residue neutralized, and the containers cleaned.

Fig. 3 — Dangerous chemicals and acids find safe storage in this specially constructed structure. Each item is stored separately and handled only by qualified personnel. (*Photos courtesy Douglas Aircraft Co., El Segundo, Calif.*)

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Process technicians are responsible for the maintenance of this controlled handling, and for the maintenance and uniformity of the product when it reaches the production line. These technicians prescribe formulas and issue laboratory reports indicating chemical additions to be made in order that proper solutions will be maintained in the shop process tanks.

A certified material division employee is given the responsibility of handling these process formulas and reports. It is up to him to superintend the mixing and delivery of the correct materials. He must supervise the mixing of the required chemicals and see that they are placed in the process tanks in accordance with process laboratory reports and formulas.

The "first in first out" principle is adhered to in handling of barreled products in the warehouse. An overhead traveling crane makes it possible to pick up any barrel from among the hundreds grouped on the floor and transport it to the mixing room. This "first in first out" rule is another aid in maintaining uniformity of the products that are delivered to the production line.

A small paint laboratory in the warehouse permits many tests and analyses to be made without resort to the more complete facilities of the main process laboratory. Thus again time is saved, and many tests for quality and uniformity are made.

There are some 1200 items stored in the paint warehouse. Among these are approximately 150 items of upholstery stock such as fiberglas battings, upholstery, hardware of various types, and fabrics.

The Douglas system, in operation now for several years, has proved efficient and thorough. All efforts in the warehouse are pointed in one direction—that is to make product finishing easier, faster, and better.

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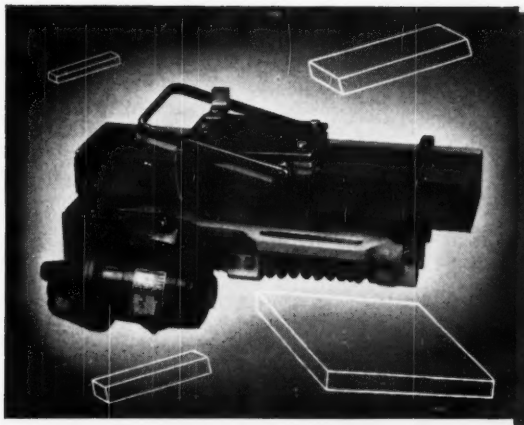

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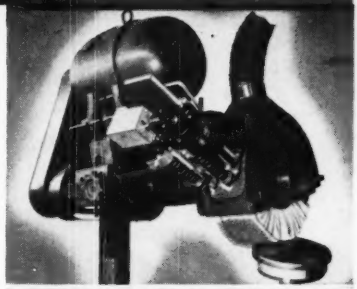

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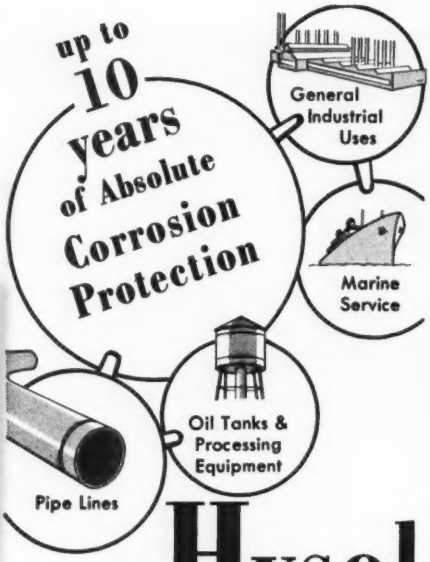

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Corrosion of Metals Underground

MUCH valuable information on the resistance to underground corrosion of a wide variety of ferrous and non-ferrous metals and alloys has resulted from field experiments[1] now being analyzed by I. A. Denison and M. Romanoff of the National Bureau of Standards. Approximately 3000 specimens of representative pipe materials, exposed to soil corrosion for periods up to 14 years, have been examined, and the loss of weight and depth of pitting have been measured and interpreted. Because of the broad range of environmental conditions commonly encountered in underground construction, the specimens were buried at 15 test sites widely separated throughout the United States.

In order to evaluate the practical importance of soil corrosion, the National Bureau of Standards began a long-term field investigation of this problem in 1922. At that time little was

[1] For further details, see Soil corrosion studies, 1946: Ferrous metals and alloys, by I. A. Denison and M. Romanoff, J. Research NBS 44, 47 (1950) RP2057; and Soil corrosion studies, 1946 and 1948: Copper and copper alloys, lead and zinc, by I. A. Denison and M. Romanoff, J. Research NBS 44, 259 (1950) RP2077.

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known concerning the useful life to be expected of underground structures for the transmission, distribution, and storage of water, gas, and liquid fuels. In the absence of information on the corrosiveness of soils, the occasional failure of metals underground was at-

Fig. 1—Specimens of pipe materials exposed to the corrosive action of the soil in field studies conducted by the National Bureau of Standards are identified upon removal from one of the test sites.

tributed to the discharge of stray electric currents in the earth or to factors, such as high acidity, which everyday experience had shown to be corrosive to iron and steel. Where these conditions were not present, it was generally assumed that an iron or steel pipe or tank of standard wall thickness might be expected to last indefinitely.

The results of this early field study, however, indicated that corrosion of ordinary types of iron and steel in soils is much more general than had been supposed, and interpretation of these results in terms of modern corrosion theory, supplemented by laboratory studies at the Bureau, showed that corrosion is a natural consequence of the normal physical, chemical, and biochemical action of soils on metal surfaces. These conclusions were later confirmed by extensive examination of underground pipe lines and correlation of the observed corrosion with the properties of the surrounding soil.

Having shown that the commonly used ferrous metals—cast iron, wrought iron, and steel—are subject generally to soil corrosion, the Bureau in 1932 began a second long-term field investigation of the corrosion of metals which either are inherently corrosion-resistant, such as copper and its alloys, lead, and stainless steel, or which had shown exceptional resistance to corrosion in the atmosphere or in natural waters. With the active cooperation of manufacturers, pipe-line operators, and local water and gas companies, a sufficient number of weighed specimens of each selected material was buried at the test sites to permit removal of two specimens of each kind after five successively longer periods of exposure ranging from two to fourteen years.

Measurement of the progress of corrosion in the specimens showed that copper and its alloys with silicon, zinc, and nickel are highly resistant, as a group, to corrosion in soils which are very corrosive to ordinary iron and steel. The copper alloys, however, differed rather widely in corrosion resistance, depending on environmental conditions. For example, in soils high in sulfides, copper corroded at an appeciable rate, but low-copper brasses were very resistant. The low-copper brasses showed good resistance to corrosion as manifested by reduction in thickness and by the development of deep pits, but this advantage was offset by their susceptibility to a form of corrosion known as dezincification, which is characterized by the conversion of more or less localized areas into

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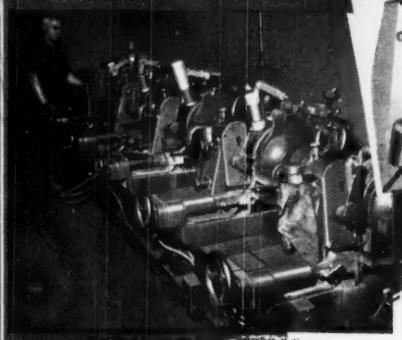

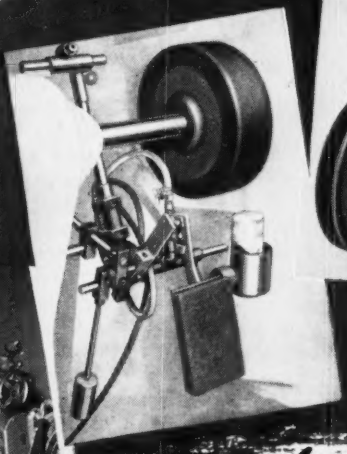

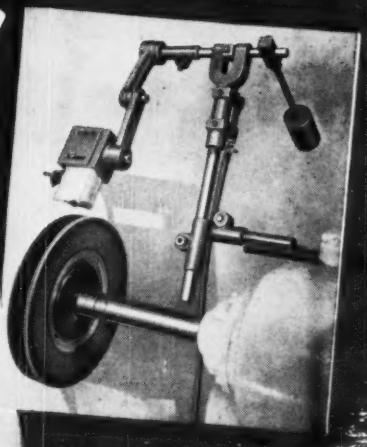

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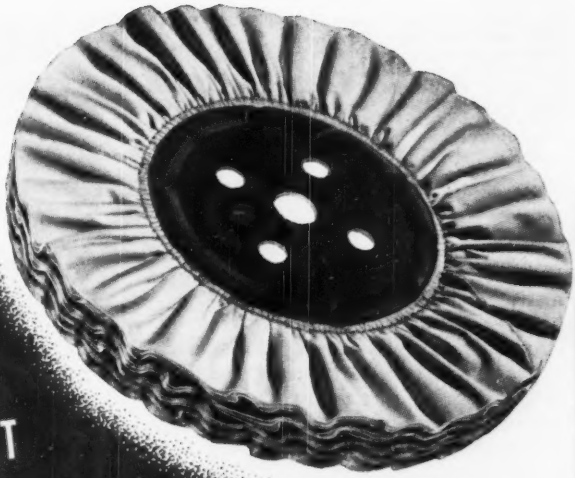
a deposit of spongy copper having little strength. This type of corrosion can be presented by the addition of a fraction of a per cent of arsenic to the alloy.

A number of metals and alloys proved to be corrosion-resistant in the sense that a piping system constructed of any of these materials would give long service underground provided a reasonable allowance were made for reduction in wall thickness by corrosion or penetration by localized attack. Certain steels containing high percentages of chromium and nickel were resistant to corrosion in a more absolute sense, no appreciable weight loss or pitting being detected even after the maximum period of exposure. However, it must be remembered that immunity to corrosion shown by small test specimens does not necessarily mean that a large structure of the same material will last indefinitely. The effect of expanding area on the depth of pitting, which in the case of plain iron and steel is well understood, has not yet been worked out for the high-alloy steels.

The measurements of the corrosion of wrought ferrous specimens indicate that small amounts of chromium, nickel, and molybdenum, which produce high resistance to atmospheric corrosion in the modern high-strength steels, contribute little to their corrosion resistance underground. This difference in behavior is believed to be due to the fact that conditions in soils do not favor the formation of tight, adherent rust deposits, on which the corrosion resistance of the steels depends.

Depending on environmental conditions, the progress of corrosion with time was found to range from cessation after a short period to continuance at a rate proportional to the duration of exposure. A high initial rate of corrosion which soon decreases may not shorten the life of a buried structure as much as a low initial rate which shows little or no decrease with

Good Advice-



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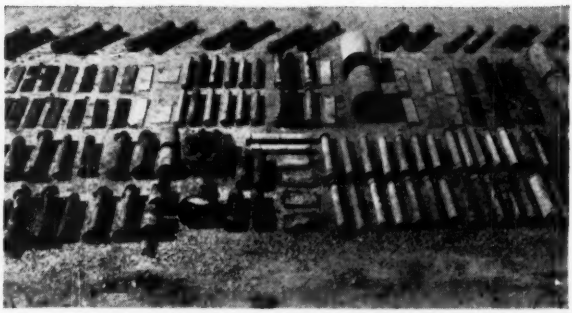

Fig. 2—Typical specimens of pipe materials buried by the National Bureau of Standards in field tests of underground corrosion are shown after removal from the ground. (*Photos courtesy National Bureau of Standards, Washington 25, D. C.*)

time. The one environmental condition which has a predominent influence on pitting and weight loss with time is aeration. Because the initial rate of corrosion of metals in soils is in general determined by the accessibility of oxygen to the metal surface, this rate must necessarily be considerably greater in well aerated soils than in a poorly drained soil deficient in oxygen. However, oxygen in excess of that required for depolarization of hydrogen causes the formation of layers of corrosion products in close contact with the corroding areas, with the result that the corrosion rate is soon substantially diminished, if not actually reduced to zero. On the other hand, in a soil containing no more oxygen than is required to maintain a low rate of depolarization, the products of corrosion diffuse outward into the soil with little or no effect on the corrosion rate. In the Bureau's studies, the corrosion of iron, steel, copper, lead, and zinc has been expressed by a single empirical equation in which one constant is the initial rate of corrosion while the other expresses the progress of corrosion with time.

The change in the rate of corrosion of metals with time is of considerable practical importance. In soils in which the corrosion rate of a metal rapidly diminishes with time, an efficient means of combatting corrosion is to provide adequate thickness. If, for example, a section of pipe is exposed to conditions which soon induce a virtual cessation of corrosion rate, the life of the pipe might very well be made infinite simply by doubling the wall thickness. On the other hand, if by doubling the thickness of the metal, only a twofold increase in useful life could be secured, the cost of the extra thickness would not be economically justified; and some other means of combatting corrosion, such as a protective coating, would be indicated. —*Technical Report* 1434, *National Bureau of Standards.*

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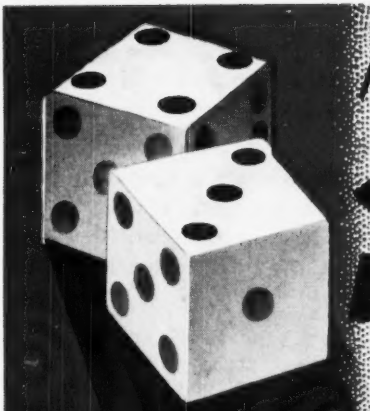

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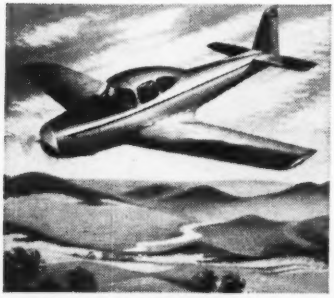

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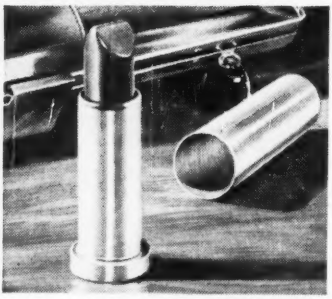

Problem: To find a finish for lipstick containers that would not be damaged every time milady took the top off.

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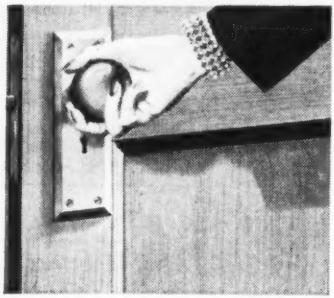

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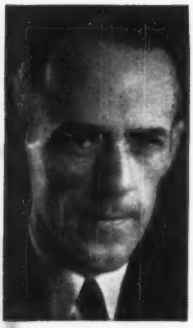

The Law and The Metal Finisher

Part II

By BRYANT W. POCOCK

AS was pointed out in the first article of this series, a contract is an agreement, duly made, by competent parties for a legal consideration to do or to refrain from doing a lawful thing or things. The characteristics of an agreement have been discussed, and it has been established that an agreement consists of an offer and its acceptance.

Not all agreements, however, can form the basis of a valid contract, for in order that a contract may be rendered binding, it is necessary that the agreement shall have been duly made.

We have all heard of contracts which have been upheld by the courts and yet were never written down. These consisted in the main of simple oral agreements or promises which fulfilled all of the other requirements of a contract. In spite of the fact that they were entirely oral, these contracts were held to have been duly made because they were sufficiently simple to preclude all uncertainty as to the terms of the agreement. This is in general a dangerous practice, however, for men's memories are notoriously short and the sudden arising of doubt where there had been no doubt, remains the ever-present peril of all oral contracts.

What happens when such an unexpected disagreement crops up to shatter a hitherto peaceful and satisfactory working arrangement? **A**, for example, may have been under oral contract to supply **B** with 500 chromium plated castings per week until a total of 100,000 castings had been furnished. A year later **B** may call **A** on the phone and say that he is very sorry but he can't use any more castings for at least six months, possibly twelve. **A** objects, stating that he is under contract. **B** agrees, but states that it was understood that the arrangement was binding only during periods when **B** could use the castings. **A** doesn't remember any such stipulation.

It is readily seen how easily **A** or **B** could resort to fraud under such a situation, relying on the passage of time to cast a certain obscurity on just what had been agreed to a year ago. It would appear now that **B's** present interpre-

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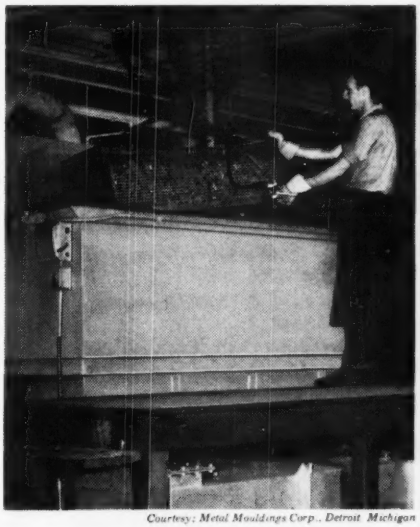

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tation might make a more reasonable and fairer contract than A's interpretation. But this has nothing to do with the oral contract which was actually entered into a year ago. The court would be faced with the problem of finding out just what the original understanding had been, not with what it should have been. "Parties are bound by the reasonable meaning of what they said and not by what they thought." So wrote the late venerable Clarence Degrand Ashley nearly fifty years ago, and this is just as true today as then.

In general, contracts should be in writing if they are incapable of completion within a year, or in any event if they contain either an original or collateral guarantee. Contracts regarding the sale or lease of lands, tenements or hereditiments or any interest therein should also be written, as well as all those involving considerations in excess of $500. Contracts falling under these classifications must be made in writing if the courts are ever expected to assist either party in case of dispute. All contracts which are important, are intricate, or require time-consuming attention should be reduced to writing as a matter of record and safety.

Competence of Parties

Parties entering into contracts must be competent to do so in the eyes of the law, or the contract is not binding on both sides, and in most cases on either side. For example, in the first article the illustration was cited of the metal finisher who contracted with his city engineer to supply $24,000 worth of zinc-plated dowel sleeves and phosphatized reinforcing steel. During the course of supplying these materials it developed that the city engineer was not registered as a professional engineer, nor was he licensed to practice as a professional civil engineer in his state, his appointment having been in the nature of a temporary political

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maneuver. The metal finisher on learning of this situation at once demanded payment in full for his services thus far rendered, and in advance for the balance, on the ground that the city engineer was not competent by law to enter into a contract of that magnitude and that he, the metal finisher, did not wish to jeopardize his interests. The city council at first refused payment, but upon being notified that no further materials would be furnished, they acquiesced summarily. (Had all of the materials been supplied there would have been grave doubt that the metal finisher could have resorted to the courts for prosecution of his claim.)

It is of interest that a minor may repudiate a contract at any time before reaching the age of twenty-one, or for a reasonable time thereafter. He may, however, hold an adult to his contract. This is true only for "emancipated" minors; that is, those not living with their parents. Otherwise the parents are held responsible and are bound by the terms of the contracts.

Corporations are fictitious individuals limited by charter to the conduct of certain businesses expressly set forth in their charters. In any case in which a corporation operates outside of its province as stated in its charter it is said under the law to be **ultra viries,** which means for practical purposes that such operation is illegal. Any contract entered into by or with a corporation during any phase of which the corporation is **ultra viries** is not a contract and hence is not enforceable.

When a private corporation is outside of its charter bounds it may be held liable to the extent of its enrichment, on the thesis that no one is entitled to unjust enrichment at the expense of another. This comes under the concept of **quasi** contracts, which do not apply in the case of public corporations. It is a very good idea to make certain of the legal authority of a representative of a city government, for

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Plating parts for the giant B-36 calls for fast, precision workmanship. That's why AiResearch Mfg. Co., Los Angeles, Calif., masks with plastic-backed "SCOTCH" Pressure-Sensitive Tape No. 470. Speed of tape application and removal has boosted production, lowered costs.

You can depend on this tape to cut your plating time, to increase plating efficiency. It will mask practically every job in your shop.

MINNESOTA MINING & MFG. CO.,
St. Paul 6, Minnesota

Please send me a sample roll of "Scotch" Pressure-Sensitive Tape No. 470 for testing purposes.

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PF-5

MAIL COUPON TODAY. Give this new plating tape a try in your own shop. Compare it. You'll see why plastic-film "SCOTCH" Pressure-Sensitive Tape is the choice of more and more experienced electroplaters. There's absolutely no obligation, of course.

SCOTCH
BRAND
Pressure-Sensitive
Tape No. 470

Made in U.S.A. by MINNESOTA MINING & MFG. CO., St. Paul 6, Minn., also makers of other "Scotch" Brand Pressure-Sensitive Tapes, "Scotch" Sound Recording Tape, "Underseal" Rubberized Coating, "Scotchlite" Reflective Sheeting, "Safety-Walk" Non-Slip Surfacing, "3M" Abrasives, "3M" Adhesives. General Export: Durex Abrasives Corp., New Rochelle, N. Y. In Canada: Canadian Durex Abrasives Ltd., Brantford, Ontario.

example, before relying on his signature to a contract.

Persons of unsound mind may repudiate a contract at any time except for executed contracts (which have progressed beyond the point of any possible return to the original status). In order that an intoxicated person may repudite a contract he must have been intoxicated to the extent that he did not know what he was doing when he entered into the contract. Drugs other than alcohol are recognized by law to produce intoxication under the meaning of this rule, as are certain psychological situations such as hypnosis, under influence, and so on.

Where it can be proved that duress or undue influence was brought to bear in the formation of a contract, or that fraud was practiced, the contract is voidable, or can be declared void at the discretion of the injured party. The following definition of fraud has served many a plaintiff and many a court in determining whether or not the statute of frauds was applicable in a given situation:

> "Fraud is a deception made with intent to deceive which did deceive the other party who acted upon the deception to his own detriment, he being unknowing that a deception was being practiced upon him."

Considerations

The legal consideration included in the definition of a contract is usually money, but need not be so. If it is not money, then it must be capable of having a monetary value placed upon it, for the courts are bound by law to express value in terms of money. The consideration is analogous to a price or a fee for something or some service.

> "A legal consideration is something done, foreborne or suffered, or something promised to be done, foreborne or suffered, and something of value in the eyes of the law."

A contractual consideration must be mutual; that is, each party to the contract must provide a consideration. Moreover, the consideration must be real and not illusory. A former or previous consideration is not valid in a subsequent contract.

Subscription contracts lacking mutuality are not enforceable, but beware of the fine print which says "for and in consideration of the subscriptions of others," which the courts of the land have ruled to be binding.

The legality of the act is the final attribute of all contracts which remains to be discussed. Where contracts are entered into for the express purpose of committing an act which is not completely legal, the courts will ordinarily refuse to assist either party in a complaint against the other. It will simply maintain a "hands off" attitude and leave both parties to work out their own salvation. It is a general rule of law that "he who would have recourse

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Engineered for production use, Nalco Infra-Red Lamps with long-lasting carbon filaments give less glare, more penetrating heat . . . assure completed jobs at a faster rate—and at a much lower cost
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makes the difference!

The gasoline pump shown is a standard example of the many familiar industrial items in daily use by millions which owe their sleek, sales-making appearance to Kirco Modern Coatings.

This actual photo of the pump rebuilt and refinished by Ten Hoeve Brothers of Paterson, N. J., graphically illustrates the sales advantage in keeping such equipment looking its best always! Periodic finish renewal with a durable, flexible Kirco Coating is the answer.

With the relationship between product *packaging* and *sales* now being fully realized, more and more oil companies are insisting on Kirco Modern Coatings for equipment refinishing. For in gasoline, the pump *is* the package!

KIRCO Kirker CHEMICAL COMPANY

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to a court of equity must come with his own hands clean."

There are, however, two exceptions to the "hands off" policy. One is the case in which one party is very much more culpable than the other. The second is in cases affecting the public welfare. Where the good of the public is concerned, it is the practice of the courts to return the parties to a financial situation identical with that existing at the time the alleged contract was initiated.

The subject matter of a contract may be illegal if it is: (1) contrary to a specific written statute; (2) contrary to custom in being harmful to the public as a whole.

In conclusion, a word about two important rules of law pertaining to contracts is in order. It is an old and honored legal principle that "parol (oral) evidence will not be admitted (in testimony) to vary the terms of a written instrument." It is every bit as old and honored a legal principle that a master is responsible for the acts of his agent. It is perhaps not as universally recognized that where a principal (the master) has been damaged by an act of his agent, the principal himself having done no wrong, even though he may be held responsible for the act of his agent, the principal may in turn recover damages from the agent.

The most significant features contained in the definition of a contract have been discussed, and it is seen that contracts are complex, valuable and important adjuncts to the everyday business machinery of a modern, well organized society. As is true of any other tool or instrument, however, or of a machine or of a piece of laboratory apparatus, a contract must be understood in order that it may be continuously useful, and of enduring value to the members of that society.

chrome plating?

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CHROMIC ACID

NEW COMMERCIAL PRODUCTION EXTRA HIGH QUALITY

Analyses by independent Testing Laboratories certify that this new production contains scarcely a "trace" of impurities . . . is consistently low in chlorides, sulphate and insolubles. It more than meets every requirement of the electroplating industry, as well as U. S. Government Specification AN-A-21.

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Better Finishes and Coatings, Inc.

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SPACE OFFERS NO PROBLEM in locating the
Presto
UNIVERSAL BACKSTAND IDLER
FOR MOUNTING ON WALLS, CEILING, BENCH OR FLOOR
1. Base angle adjustment
2. Leaf spring tension belt
3. Belt tension adjustment
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Just what you want in the way of a backstand idler that will fit limited space. No need to rearrange machines as you can attach the Presto Universal Backstand Idler. Limited space is no handicap.

This backstand is sturdy and rugged... built for long dependable service. It has 12-inch belt tension adjustment (crank operated), leaf spring tension to keep abrasive belts tight... it is easily changed from right to left hand operation... belt tracking adjustment is provided. The balanced pulley is 10 inches in diameter with 6½-inch face. It is equipped with sealed ball bearings packed in grease. Write today for full information.

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• METAL FINISHING SUPPLIES AND EQUIPMENT •

Processing Cycles for Chromium Plating

By JEROME L. BLEIWEIS
Metal Finishing Consultant

ONE of the widely-used industrial electroplating processes is decorative chromium plating. Decorative chromium plating, as opposed to "hard" chromium plating, may be defined as that process wherein chromium is deposited as a thin coating, usually upon a previously deposited nickel plate, for the purpose of providing a non-tarnishing durable coating for decorative purposes. The deposit thickness is generally between 0.00001 and 0.00002 inch. At these thicknesses only the decorative aspects of the deposits can be considered, any hardness increase or other physical properties of the heavier chromium deposits being negligible. The most important consideration in the operation of a decorative chromium plating process is the attainment of those conditions which will yield the widest bright plating range.

In industrial decorative chromium plating the problems encountered are the combined problems of the chromium bath plus the problem of nickel plating. It is almost axiomatic to say that a chromium deposit can be no better than the nickel undercoat. If the nickel undercoat is correctly plated from the points of view of adhesion, brightness, lack of passivity, good covering, and so on, then problems encountered in chromium plating will be less difficult to solve.

Chromium plating baths are composed essentially of two constituents, chromic acid and sulfuric acid. There are substances which are substituted for the sulfuric acid, such as zinc sulfate, complex fluorides, hydrofluoric acid or fluoride salts. However, the chromic-sulfuric acid combination is generally used. Chromium plating tanks are generally steel tanks lined with antimonial lead, employing anodes of the same material and heated or cooled by means of antimonial lead coils. The tanks are equippd with suitable exhausts to remove the highly injurious chrome acid spray which is formed during the plating process.

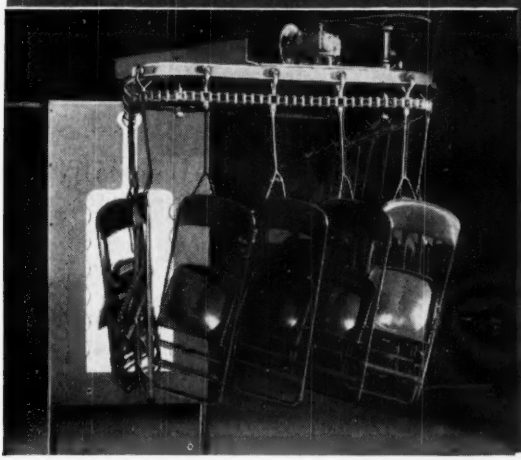
Any basis material may be decorative chromium plated. The commonly plated materials for which procedures follow are ferrous metals (steel), copper alloys (copper, brass, and bronze), zinc die castings, lead base alloys, aluminum alloys, and magnesium alloys. The procedures presume the use of bright nickel baths wherever nickel is plated and presume further the conclusion of buffing and polishing operations before plating.

Ferrous metals:

1. Electroclean cathodically in a heavy duty alkaline cleaner for steel for 15 seconds to 1 minute.
2. Reverse clean in same cleaner for 5 to 15 seconds.
3. Rinse in cold water.
4. Pickle in muriatic acid (10 to 50 per cent).

IN 6 SHORT WEEKS "KNOW-HOW" PAID OFF

THIS JENSEN *ECONOMY ENGINEERED* COORDINATED FINISHING SYSTEM



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50% ON BAKING TIME

The above figures SHOW HOW Jensen "KNOW HOW" solved a problem and is saving money in finishing steel folding chairs for Acme Chair Company, Reading, Michigan.

Jensen finishing systems utilizing infrared radiant heating, with or without co-ordinated conveying, are *engineered for economy*—designed to increase production and minimize rejects; produce a uniform, finer, tougher finish in less time using less floor space.

Whatever YOUR product . . . whatever YOUR equipment . . . whatever YOUR finishing problems may be, a Jensen Finishing System to replace or complement your present heating equipment—offers you many money-saving advantages.

ABSOLUTELY WITHOUT COST OR OBLIGATION TO YOU

We will conduct laboratory tests on *your* products, using *your* finishes. Parts will be returned promptly for your inspection, together with recommendations to meet *your* production requirements. *You get* practical PROOF of every possible cost saving.

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"DUAL HEAT" INFRARED OVENS • CONVEYORS • PAINT DIP TANKS

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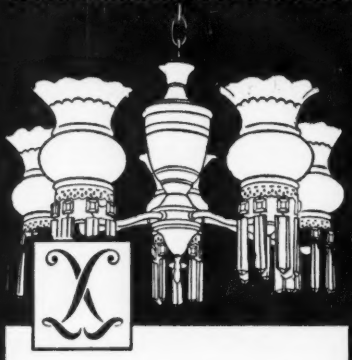

. . . lacquer is durable and resistant to abrasion . . . keeps bright the lustre of Lightolier's fine lamps and lighting fixtures. Lightolier prefers lacquer because it resists moisture, perspiration, alcohol, mild soap alkalies, and cooking vapors.

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HELPS YOU SELL

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5. Rinse in cold water.
6. Copper and nickel plate or nickel plate only.
7. Rinse very thoroughly in clean, running cold water.
8. Chromium plate for 1 to 4 minutes.
9. Drag-out rinse.
10. Rinse cold, hot, and dry.

Copper alloys (copper, brass, bronze):

1. Electroclean cathodically in a buffered alkaline cleaner for brass for 15 seconds to 1 minute.
2. Reverse clean in the same cleaner for 2 to 4 seconds.
3. Rinse in cold water.
4. Electroclean cathodically for seven seconds in the heavy duty steel cleaner.
5. Reverse clean in the same cleaner for 1 second.
6. Rinse in cold water.
7. Pickle in 5 to 10 per cent muriatic acid.
8. Rinse in cold water.
9. Nickel plate.
10. Rinse very thoroughly in clean, running cold water.
11. Chromium plate 1 to 4 minutes.
12. Drag-out rinse.
13. Rinse cold, hot and dry.

Zinc die castings:

1. Preclean by vapor degreasing or emulsion cleaning.
2. Soak alkaline clean in a buffered trisodium phosphate type cleaner for 15 seconds.
3. Anodic clean in same cleaner for 5 to 15 seconds.
4. Rinse in cold water.
5. Pickle in 2 to 5 per cent muriatic acid.
6. Rinse in cold water.
7. Cyanide copper plate (minimum of 0.0002 inch).
8. Rinse thoroughly in cold water.
9. Quick pickle in 2 to 5 per cent muriatic acid.
10. Rinse in cold water.
11. Nickel plate.

NEW!

Highest stabilized degreasing solvent

—*Stabilized NOT Alkalized*

Years of research and development have produced this outstanding new BLACOSOLV. This new product has been subjected to the most rigorous stability tests for the most difficult jobs. Contains no alkaline materials which neutralize acid *after* breakdown. The new stabilizers *prevent* solvent breakdown and possible acid formation.

The new BLACOSOLV will degrease scientifically all metals or combinations of metals. You need not pay premium prices for special solvents for different metals. Blacosolv can be used over and over without impairing its high qualities.

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DEGREASERS AND SOLVENT

NIAGARA
METAL PARTS WASHERS

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NEW YORK, N. Y. TORONTO, ONT.

12. Rinse very thoroughly in clean, running, cold water.
13. Chromium plate 1 to 4 minutes.
14. Drag-out rinse.
15. Rinse cold, hot and dry.

Lead base alloys:

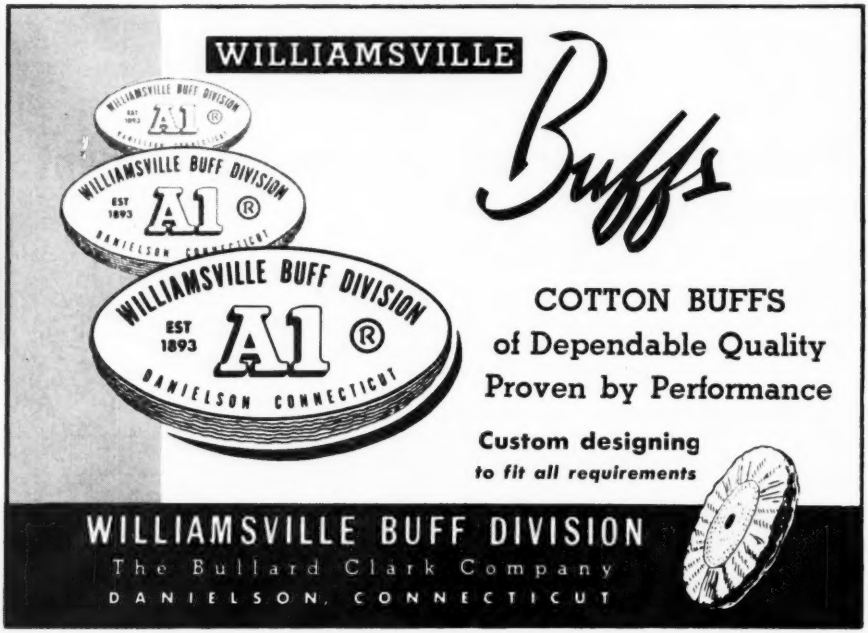
1. Soak alkaline clean in a buffered cleaner for 5 to 10 seconds.
2. Rinse in cold water.
3. Pickle quickly in 5 to 10 per cent muriatic acid.
4. Rinse in cold water.
5. Copper flash and nickel plate or just nickel plate.
6. Rinse very thoroughly in clean, running, cold water.
7. Chromium plate 1 to 4 minutes.
8. Drag-out rinse.
9. Rinse cold, hot, and dry.

Aluminum alloys:

1. Preclean by vapor degreasing.
2. Alkaline clean by soaking in an aluminum cleaner.
3. Rinse in cold water.
4. Etch in chromic-sulfuric acids or in caustic soda (for cast alloys).
5. Rinse in cold water.
6. Dip in nitric-hydrofluoric acids or in nitric acid (for wrought alloys).
7. Rinse in cold water.
8. Zinc immersion dip for 2 seconds to 5 minutes depending upon rate of formation of the zinc coating.
9. Rinse in cold water.
10. Cyanide copper plate.
11. Rinse in cold water.
12. Nickel plate.
13. Rinse very thoroughly in clean, running, cold water.
14. Chromium plate.
15. Drag-out rinse.
16. Rinse, cold, hot and dry.

Magnesium alloys:

1. Preclean by vapor degreasing.
2. Soak clean for 5 mintues in an alkaline cleaner composed of 8 oz./gal. of trisodium phosphate.



MULTI-PURPOSE

NEW TYPE COATING

1. Prolongs product life

2. Cuts structural maintenance costs

Rust-Chek

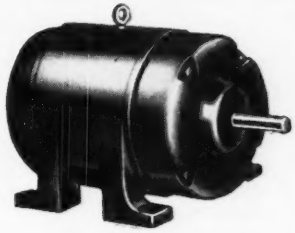
COATING

resists water, salt and fumes

Originally developed, on special request, to stop excessive corrosion of railway track in tunnels, this new type coating is finding ever broadening acceptance as both a product undercoat and for maintenance painting as a 2-coat operation.

Rust-Chek has exceptional resistance to water, salt and acid fumes; retains, through long years of service, unusual qualities of flexibility and adhesion that definitely prevent chipping, cracking or peeling.

Investigate now! Skilled Rinshed-Mason engineers to help you!



For PRODUCT UNDERCOATS

Corrosion-resistant, tough and durable, Rust-Chek is highly recommended as a product undercoat, and especially if the product will ultimately be subjected, in use, to corrosive atmospheres and moisture. *May also be used as a finish coat if high gloss and special coloring are not required.*

For STRUCTURAL STEEL

Bridges or factory structural steel work can be quickly and easily coated with Rust-Chek, adding countless years of life and greatly lengthening time between coats. Rust-Chek puts up a solid front against salt spray, fumes from processing equipment, etc.

Write for DESCRIPTIVE FOLDER

Free Descriptive Folder and specifications will be sent you on request. Test sample will also be forwarded if wanted.

RINSHED-MASON CO.

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3. Reverse current clean for 15 seconds in the same cleaner.

4. Rinse in cold water.

5. Pickle in a 1 per cent muriatic acid solution.

6. Rinse in cold water.

7. Immerse in acetic acid or aluminum chloride activating dip for 15 seconds to 1 minute.

8. Rinse in cold water.

9. Immersion dip in zinc immersion solution for magnesium for 3 to 5 minutes. The solution is:

Tetra sodium pyrophosphate ---------- 16 oz./gal.
Zinc sulfate ---------- 5.4 oz./gal
Potassium fluoride ---------- 1.3 oz./gal.
Potassium carbonate ---------- 0.7 oz./gal.

10. Rinse in cold water.

11. Copper plate in Rochelle type bath.

12. Rinse in cold water.

13. Nickel plate.

14. Rinse very thoroughly in clean, running cold water.

BOOTHCOTE

cleans spray booths quickly, economically, safely!

Spray Boothcote on clean booth. Surplus paint can then be peeled off in sheets by any operator.

- Saves time and labor
- Time-tested; used for 11 years
- Mixed—ready to use

- Can be brushed or sprayed
- Non-inflammable; safe to store
- Does not flake off

Money back trial offers: 5 gals. $6.25 f.o.b. Buffalo or write for Circular.

Distributors! Write for open territories.

HYGRADE FOOD PRODUCTS CORP.

Boothcote Div., 19 Stetson St., Buffalo 6, N. Y.

15. Chromium plate 1 to 4 minutes.

16. Drag-out rinse.

17. Rinse cold, hot, and dry.

Note: The above process is covered by patents assigned to The Dow Chemical Company.

Buffed nickel plate:

1. Cathodic clean alternately in buffered and heavy duty cleaner for five seconds at a time until no water breaks appear after the cold rinse following the acid pickle. Do not clean anodically.

2. Rinse.

3. Pickle in 10 per cent muriatic acid.

4. Rinse very thoroughly in clean, running, cold water.

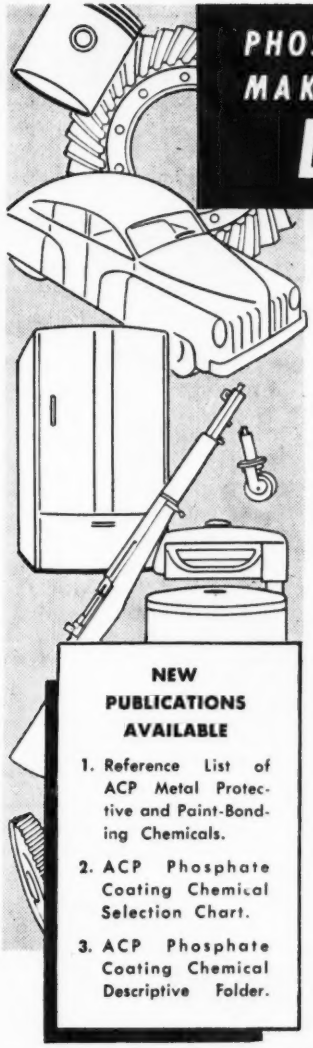
5. Chromium plate 1 to 4 minutes.

6. Drag-out rinse.

7. Rinse cold, hot, and dry.

The quality of the final decorative chromium plate will be related to the care with which any of the steps before chromium plating are carried out. If all the steps in the process are correctly performed, bright, highly reflective chromium deposits will appear even after chromium plating periods greatly in excess of the 4 minutes specified. Frequently platers undercut the chromium plating time because of the fear that longer plating periods will produce deposits which are dull around the edges. Where this does occur it is a sign of a failing in the process and is not a normal phenomenon.

Scientists in paints and finishes laboratories carefully pre-test all coatings, whether they are to be used by the home owner, master painter or the manufacturer of a product which calls for a protective and beautifying finish. To determine the durability of a coating, an abrasiometer is frequently used. This instrument gives the coating a rougher going over than it will probably ever get in ordinary usage. It tells the expert exactly how well a protective finish will stand up in actual use under the strain of abrasion.



PHOSPHATE FINISHES TO MAKE YOUR PRODUCT DURABLE

CHEMICALS ACP PROCESSES

PAINT BONDING

"Granodine" forms a zinc-iron phosphate-coating bond on sheet metal products — automobile bodies and fenders, refrigerator cabinets, etc. — for a durable, lustrous finish.
"Lithoform" makes paint stick to galvanized iron and other zinc and cadmium surfaces.
"Alodine", the new ACP protective coating chemical for aluminum, anchors the paint finish and protects the metal.

RUST PROOFING

"Permadine", a zinc phosphate coating chemical, forms on steel an oil-adsorptive coating which bonds rust-inhibiting oils such as "Granoleum."
"Thermoil-Granodine", a manganese-iron phosphate coating chemical, forms on steel a dense crystalline coating which, when oiled or painted, inhibits corrosion.

PROTECTION FOR FRICTION SURFACES

The oiled ***"Thermoil-Granodine"*** coating on pistons, piston rings, cranks, camshafts and other rubbing parts, allows safe break-in operation, eliminates metal-to-metal contact, maintains lubrication and reduces the danger of scuffing, scoring, galling, welding and tearing.

IMPROVED DRAWING AND EXTRUSION

"Granodraw" forms on pickled surfaces a tightly-bound adherent, zinc-iron phosphate coating which facilitates the cold mechanical deformation of steel, improves drawing, and lengthens die life.

Write or call for more information on these products, and advice on your own metal-working problem.

NEW PUBLICATIONS AVAILABLE

1. Reference List of ACP Metal Protective and Paint-Bonding Chemicals.
2. ACP Phosphate Coating Chemical Selection Chart.
3. ACP Phosphate Coating Chemical Descriptive Folder.

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Manufacturers of Metallurgical, Agricultural and Pharmaceutical Chemicals

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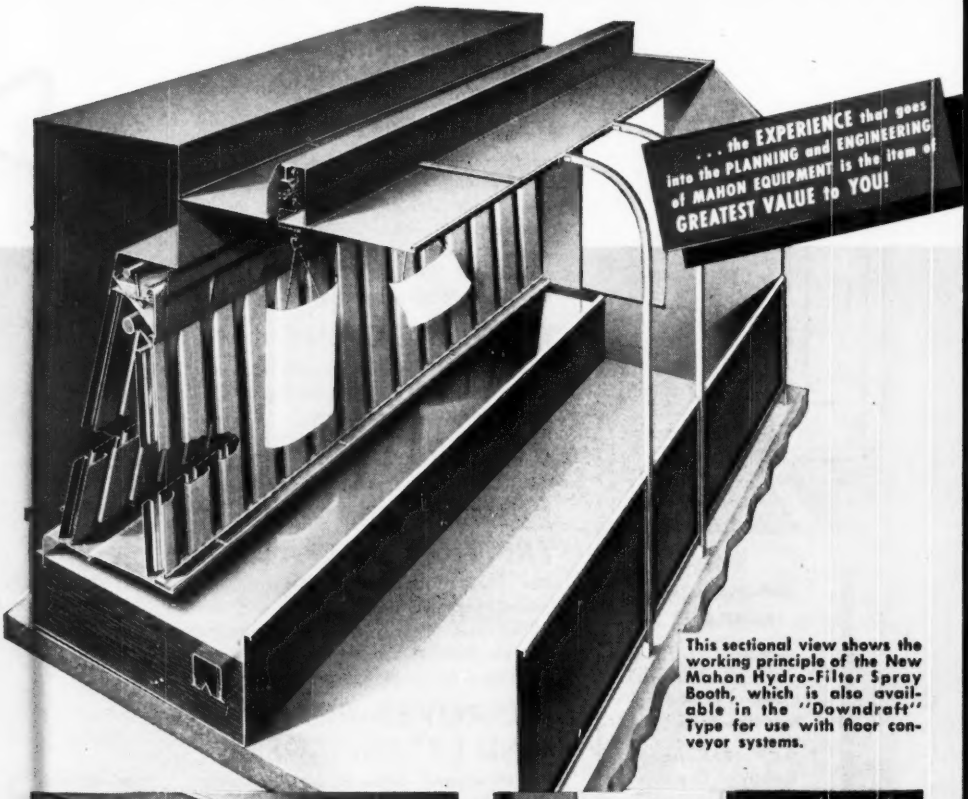
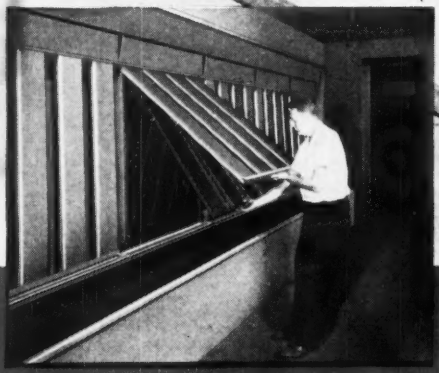
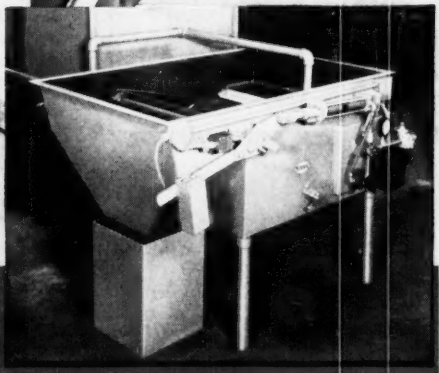


This sectional view shows the working principle of the New Mahon Hydro-Filter Spray Booth, which is also available in the "Downdraft" Type for use with floor conveyor systems.



The Mahon "HYDRAIRE" Flood Sheet and the Eliminators in rear of the washing chamber of the Hydro-Filter Unit are removable in sections from the front. This facilitates inspection and cleaning if necessary.



Mahon Automatic Sludge Segregator and Unloader. This device automatically removes the paint sludge from the surface of the spray booth charging tank as fast as it accumulates . . . saves many man hours.

. . . THE NEW MAHON

HYDRO-FILTER SPRAY BOOTH

WITH THE "Hydraire" FLOOD SHEET

(Pat. Appl. For)

Greatest Advance in Spray Booth Development in TWO DECADES!

In an endeavor to reduce cleaning and maintenance requirements of spray booths to a minimum, and to eliminate the necessity for periodic interruptions in production to permit removal of paint sludge from the surface of the solution in the charging tank, Mahon engineers have come up with an entirely new concept in the principles of overspray control and disposal.

A new, vertically fluted "HYDRAIRE" flood sheet (Patents Applied For) consisting of a staggered front and rear section, permits passage of air through the flutes and creates an even suction over its entire flooded area. This eliminates eddies, and produces an even flow of air throughout the working area of the spray booth . . . working conditions are thereby vastly improved. Front and back sections of this new flood sheet are so designed, coordinated and flooded as to produce eddying traps which remove the bulk of the overspray at this point. The remainder of the overspray is struck from the air by torrents of chemically treated water in rear of the flood sheet. Water eliminators, similar in design to the Hydraire flood sheet, form the rear wall of the washing chamber and effectively remove the entrained water from the air.

In this new spray booth, twice the amount of water is circulated at one-half the static pressure required in former models. The washing area has been increased four and one-half times . . . the density of paint overspray per cubic foot of washing area is therefore reduced by a like figure. Cleaning and maintenance problems are reduced to a minimum.

Sludge disposal problems have also been solved in this new spray booth. Particles of paint forming into a sludge on the surface of the charging tank move constantly, due to an induced water current, toward and over a weir into a jet eductor chamber where the sludge is picked up as fast as it accumulates and conveyed hydraulically to an Automatic Sludge Segregator and Unloader.

The Automatic Sludge Segregator and Unloader (Patents Applied For) may be located in any convenient place in relation to the spray booth. It traps the paint sludge removed from the chemically treated water and returns the water to the charging tank of the booth—this circulation continuous while the spray booth is in operation. The unloading device, which functions automatically, dumps the accumulated paint sludge through a hopper into any portable receptacle for reclamation or disposal.

This new Mahon Spray Booth can also be furnished in the "Downdraft" Type, for floor conveyor systems, with Hydro-Filter Units below the floor level of the booth. Both types can be engineered to accommodate any product regardless of size or shape.

Mahon engineers will gladly explain, at your convenience, the many labor-saving advantages of this new, highly efficient, trouble-free spray booth.

THE R. C. MAHON COMPANY

HOME OFFICE and PLANT, Detroit 11, Mich. • WESTERN SALES DIVISION, Chicago 4, Ill.

Engineers and Manufacturers of Complete Finishing Systems—including Pickling Equipment, Metal Cleaning and Rust Proofing Equipment, Dry-Off Ovens, Hydro-Filter Spray Booths, Filtered Air Supply Systems, and Drying and Baking Ovens of All Types, Dust Collectors, and other Units of Special Production Equipment.

MAHON

Developments in Galvanizing

By F. G. WHITE
Technical Director, Granite City Steel Company

THE method of manufacturing flat rolled steel products, such as plates, sheets, strips, and tin plate, has undergone a radical change in the last twenty years. The invention of the wide strip mill, known as the sheet strip mill, has enabled steel producers to make a better product at a reasonable cost. The hot and cold rolled sheet as made on the continuous mill is of a quality unheard of just twenty years ago. This higher quality of ductility, flatness, and surface has simplified the manufacturing methods of countless steel users and helped create a much greater demand for the product.

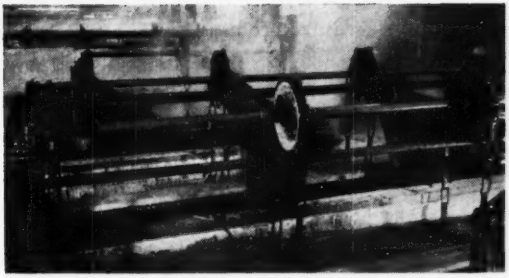
Galvanized sheet production in 1948 of 1,625,000 tons is only 5 per cent greater than the 1929 production. Ir. 1932, galvanized sheet and cold rolled production were equal, while now cold rolled production is five times that of galvanized. This poor showing in galvanized sheet production must be due to the fact that the method of manufacture and the quality have not kept pace with these modern times.

After seventy-five years, sheet galvanizing is now being modernized. Originally hot dipped by hand in a kettle of molten zinc, a galvanized sheet in the early days had poor coating uniformity, poor adherence, poor appearance, and a decided lack of flatness. However, the excellent protection that a metallic zinc covering gave to the wrought iron sheet created a demand for a galvanized sheet.

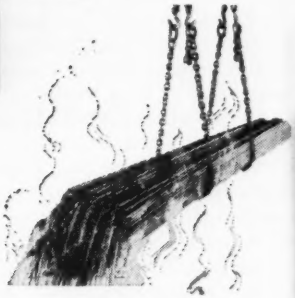
About 1901, hand dipping gave way to machine coating which greatly improved coating uniformity, appearance, and flatness. The use of exit rolls permitted coating weight control and the 2½-ounce hand dipped coating was reduced, making it possible to hand fabricate the galvanized sheet without peeling of the coating, thereby opening new uses for the sheet.

Just prior to World War I, mechanical fabrication of galvanized sheets got under way using seaming rolls, dies, and so on, but the coating adherence of the product left much to be desired. However, mass production of the finished articles lowered their cost, improved availability, and made a larger market for galvanized sheets. To improve this coating adherence, lighter coatings were used and tin additions were made to the bath since the tin addition made the metal more fluid and assisted in making even lighter coatings. The lead-zinc bath became very popular for the production of tight coat, and coatings of 0.50 to 0.75 ounce were common. In the lead-zinc process, the steel sheet was first preheated in molten lead, so that when it came in contact with the zinc a very short immersion time was necessary, thereby retarding the formation of iron-zinc alloy in the coating.

Following World War I, when the



Former chains on these mechanical picklers used to fail in 2½ months. Monel chains are giving 1½ years' service 24 hours a day in hot, 10% sulfuric acid. Average load is 5 tons. Reduced shut-downs have increased output substantially.



Monel sling chains handling 4 to 5 tons of steel tubing. 75 such chains are in this plant. Where 1¼" chains of another metal failed in 9 months, these Monel chains have already served 6 years.

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Regular Monel chain ranges in size from ¼" to 1¼". In addition, special types of sprocket chain, as well as a complete line of accessories such as hooks, lifting links, U-bolts and open links are available.

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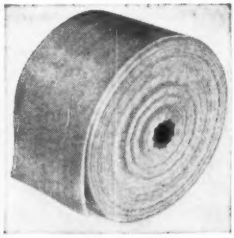
price of zinc was high, many roofing manufacturers saw an opportunity to greatly reduce their roofing sheet cost by the use of the lead-zinc pot. Gas heat and automatic temperature control improved the quality of the product, but basically there were two types of sheets needed—a heavier coated sheet for roofing exposure and a tightly adherent coating for manufacturing uses, and at this stage a tightly adherent coating could best be obtained by reducing the coating weight. Most of the rusty metal roofs resulting during this period indicated that the producing mills felt that coating adherence was more to be desired than longer-life, heavier coatings. Many fabricating jobbers were buying flat galvanized sheets, some of which might be corrugated while others would be used to manufacture gutter, downspout or draw press jobs.

Your Zinc Institute saw what was happening to the reputation of galvanized roofing and after careful study brought out the Seal of Quality specification for roofing sheets which, selling at a higher price because of the higher quality, gave the mills and jobbers an opportunity to carry two stocks—one a commercial coating (naturally light coated, so as to reduce peeling hazard), and a good heavier coated sheet suitable for roofing exposure but with a coating not so adherent. The various mills took license from the Zinc Institute to produce this sheet, but the difficulty and expense of two stocks have kept the Seal of Quality tonnage relatively small.

In the 1930's, with sheets being produced in coil form, opportunity for continuous galvanizing became apparent. In the late 1930's several mills set up necessary equipment to hot galvanize the product from coils, shearing to sheets after coating. It was reasoned that production would be increased since there would be no gap



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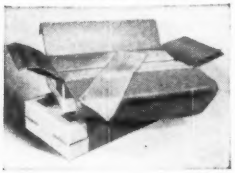

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between sheets, better coating uniformity would be obtained and, if desired, galvanized sheets could be supplied in coil form.

The galvanizing equipment manufacturers were quick to offer equipment to permit continuous galvanizing of coils, but this did not solve the real problem since the coating adherence was little or no better than the conventional sheet product, and coating weight and adherence were still at opposite points on the performance chart. Up to this time, the method of coating still consisted of acid pickling, fluxing in sal ammoniac, and coating in molten metal.

In the middle 1930's, a new idea was introduced in sheet galvanizing whereby the product to be galvanized could be preheated in a neutral or reducing gas atmosphere and enter the zinc bath without coming in contact with the oxygen of the air. This revised the whole principle of sheet galvanizing, since the chemically clean steel did not carry soluble iron salts from the acid pickling, and the preheated strip did not make superheating of the zinc bath necessary. In the old process, the superheated kettle walls caused the metal in the bath to circulate, alloying with the dross aready trying to settle to the bottom of the kettle—this causing the rapid formation of more dross. Since the entering strip was now heated, it was no longer necessary to drive more and more heat into the kettle as speeds increased, to balance for the cold material entering the kettle. Excellent adherence could now be obtained in any coated weight.

Continuous galvanizing also offers other advantages in that several finishing operations can be combined with the galvanizing line, such as annealing, shearing, and stenciling, all of which help reduce costs of production.

During World War II, steel demand made it impossible to do much development work; but immediately after the war, several other producers began construction of full-sized continuous galvanizing lines based on the new type of galvanizing and, although there is some variation in the layout and the chemical additions made to the zinc bath, the resultant product has a coating adherence that will open new fields to galvanized sheets. At present there are seven continuous lines in operation with three more under construction. Conservative production for a continuous line is 50,000 tons a year which, on present total galvanized sheet production, means that one-third of all sheets will be continuously galvanized by the end of the year. While the cost of one line will run between $1½ and $2 million, the labor savings plus improved quality seem to indicate it is a good investment.

In reviewing the new developments in flat rolled steel manufacture, the strip sheet mill greatly increased the production of sheets, which was follow-

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The cost of plating racks; meaning the rack itself, its insulation, and necessary repairing is often an important factor in production plating costs. Low first cost in dollars is not always the lowest final cost. Good racks that can be kept in production work day after day mean savings in time and labor and increased output of good work.

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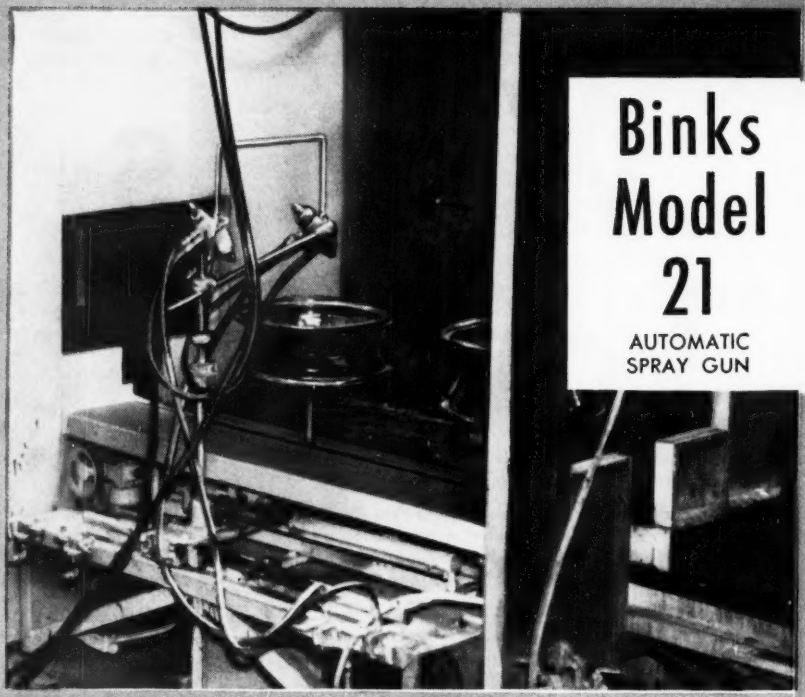

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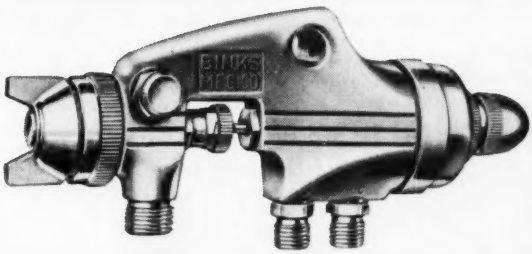

Binks Model 21 is a heavy-duty automatic spray gun for applying fine finishes. It turns on and off pneumatically. Fluid nozzles of specially hardened steel give long service. Needle valve is adjustable to compensate for wear and is self-centering on a tapered seat. Air leakage is eliminated. It starts instantly...with no dripping ...no spitting.

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ed by new and larger uses for the product. Cold reduction of tin plate replaced the costly pack rolling method in about eight years. Electrolytic tin plate in eight years accounts for 60 per cent of all tin plate made. Continuous galvanizing of sheets is progressing so rapidly that it will not need eight years to see the process in general use.

Some of the large sheet producers found the old galvanizing process unprofitable and temporarily gave up production, but the unprecedented demand for cold rolled sheets by the automotive industry may have influenced their decision.

Now that modern efficient methods have been worked out for galvanizing sheets, it would seem natural to expect that additional new lines will be put in operation as soon as the automotive demand is satisfied. Perhaps galvanized sheet production will again equal cold rolled sheet production.

(*Adapted for PRODUCTS FINISHING from an address presented at 32nd Annual Meeting, American Zinc Institute, Inc., St. Louis, Missouri, April* 11, 1950)

When developing coatings for household equipment, the scientists of the finishes and paint industry always give careful consideration to the various conditions and substances that may subsequently affect the finish. In the case of refrigerators, for instance, a coating is checked for adhesion, flexibility, toughness, and resistance to chipping. It is also tested for its imperviousness to food and beverage stains: fruit juices, alcohol, oil, grease, rancid butter, and so on. Finishes for refrigerators using sulfur dioxide as a refrigerant must have a high sulfur dioxide rating because of the possibility of a unit starting to leak and causing discoloration of the surface. Finishes are also checked for their resistance to heat, humidity, weather and ultraviolet rays.

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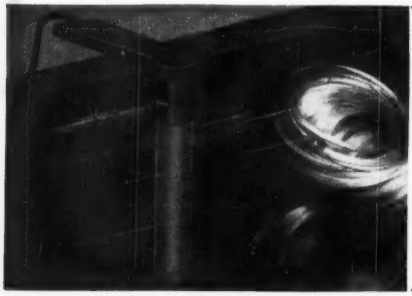

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Spotlighting FINISHING Progress

Metal Coatings Formed by Methods Other Than Electrodeposition

By DR. ALLEN G. GRAY

HOW is the manufacturer of a metal product to know just which one of the many types of available finishes is best suited to his purpose? Even if the problem is chiefly one of rustproofing, many methods are available. Appearance is a factor too, since many a metal product has passed its useful life when it gets an unsightly appearance. One of the problems being faced by manufacturers today is that of putting the right finish on the right product. Thus, one of the important factors in nearly every metal working problem is a knowledge of available finishing methods and something of what is involved in their use.

There are ways to metal coat a base metal for almost any desired service. Some of the more unusual methods for producing metal coatings were discussed by Dr. Bruce W. Gonser, Battelle Memorial Institute, before the recent annual 1950 joint meeting of the American Chemical Society's Western New York Section and the Niagara Falls, New York Section of the Electrochemical Society. Dr. Gonser's topic was "Metal Deposition Other Than Electrolytic". Some of the developments in new metal coating methods are still too recent to have the advantage of much commercial experience, but it is technically possible and in some cases economically feasible to consider some of these unusual methods for production use.

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Fig. 1—This wringer cover for a domestic washing machine is manufactured from steel having a "Zincgrip" hot dip coating. Neither deep drawing nor embossing operations have caused any flaking or peeling of the zinc coating. (*Photo courtesy Armco Steel Corporation*)

Hot Dip Coatings

Hot dipping or immersing a metal in molten coating metal, according to Gonser, is the oldest and in many cases probably the simplest coating method. However, methods for coating steel with aluminum have been developed only recently. Also, methods have been modified to produce more ductile and formable zinc coatings. Only a few metals meet the two main requirements for hot dipping; namely, low melting point, and ability to wet the base metal surface. Zinc, tin, terne metal and aluminum are the principal metals applied to steel surfaces by hot dipping methods. The most widely used hot dip coating is zinc. Improved adherence of galvanized coatings on sheet steel has been brought about by special surface preparation of the sheet and the addition of a small amount of aluminum to the zinc. The improved ductility of this type of coating, as compared with straight galvanized coatings, and the adhesion properties have resulted in applications for this special galvanized sheet where the coating on regular galvanized sheets might peel from the base metal or break in the draw. The use of a coated product of this type has displaced articles formerly hot dipped after fabricating in some manufacturing operations. Shown in Fig. 1 is a wringer cover for a domestic washing machine produced from a zinc-aluminum type galvanized sheet, known as "Zincgrip", by a deep drawing and embossing operation.

Hot dipped aluminum coatings are now being used for the protection of steel under severe corrosion conditions, particularly at elevated temperatures. According to the Armco Steel Corporation, producer of an aluminum coated steel sheet known as "Aluminized" steel, the corrosion resistance is, in general, superior to galvanized steel, as is the heat resistance and heat reflectivity. Because the coating can be buffed to a fairly high luster, it has an attractive appearance. The coated product will withstand temperatures up to about 900 deg. F. without discoloration. Above this temperature, the aluminum begins to alloy with the base metal but still affords good heat resistance. Typical uses for aluminized steel that have been reported by

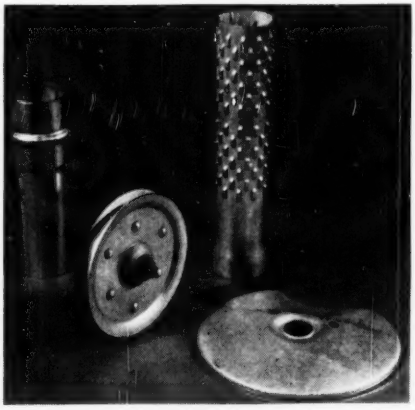
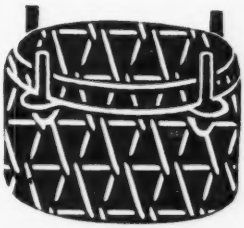


Fig. 2—Parts manufactured from hot dip aluminum coated steel. The two pipes are muffler parts. The wheel is an overhead door pulley. The plate is a heat reflector for an electric stove.
(*Photo courtesy Armco Steel Corporation*)

Tough yet Gentle



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Armco are for circulating heater parts; combustion chambers of heating furnaces; heat deflectors for electric ranges; oven liners for kitchen ranges; range interior main bodies; and automotive mufflers and tail pipes. Figure 2 shows typical parts fabricated from the commercial product.

Gonser stated that work being conducted at Battelle Laboratories indicated promise for coating of steel wire with aluminum; also, work is progressing on processes for hot dipping miscellaneous articles in aluminum. Of further interest to the finishing engineer considering the use of aluminum coatings for his products is a recent report from the Aluminum Company of America Research Laboratories by P. T. Stroup and G. A. Purdy which compares the various processes for producing aluminum coatings. "Metal Process"—Jan. 1950). An important fact brought out in this report is that the one problem common to all processes for coating steel with aluminum is control of the formation of the iron-aluminum compound, which consists of several of the intermediate phases in the iron-aluminum system.

For resistance to oxidation and scaling, the iron-aluminum compound should not form to the extent that the surface becomes brittle and spalls. When the aluminum content of the surface zone approaches 50 per cent, a brittle condition exists. The Aluminum Company research workers, Stroup and Purdy, indicated that the real protection in this case is probably afforded by a layer of aluminum oxide on the surface of the iron-aluminum alloy. The iron-aluminum compound is not desired as the surface layer when protection against corrosion is the object of the coating. This iron-aluminum originates whenever steel is heated in contact with aluminum at a temperature above about 1100 deg F. and increases as the time is increased. The

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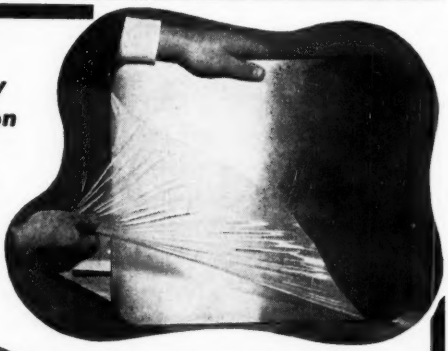

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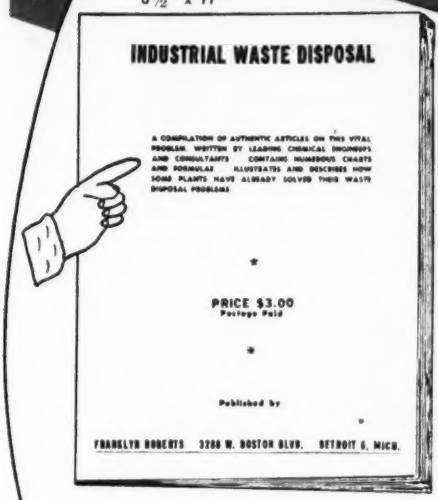
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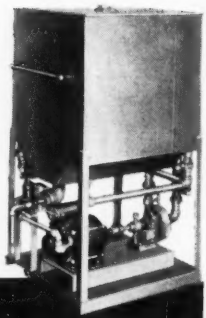

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formation of an interfacial brittle zone of this material occurs during the annealing of aluminum coated steel products. According to Stroup and Purdy certain alloying additions have been reported to hinder the formation of the iron-aluminum compound. Some benefit is obtained by the presence of silicon or chromium in the steel.

In applying an aluminum coating to steel by hot dipping, it is desirable to hold the brittle iron-aluminum interfacial layer to a minimum thickness. One of the most effective means for doing this is by the addition of silicon to the aluminum coating bath. With 2.5 per cent silicon there is considerably less of the alloy layer formed. A smaller decrease occurs as the silicon content is further increased. Another important factor is the temperature of the coating bath; as the temperature increases, a thicker interfacial layer forms, both for pure aluminum and the 5 per cent silicon alloy. A wider range of temperature can be tolerated in a commercial coating process using the silicon alloy. Stroup and Purdy reported that in a typical hot dip coating process the flux is maintained at around 700 deg. F. and the aluminum silicon alloy bath about 1250 deg. Fahrenheit.

Vapor-Phase Deposition

While aluminum coatings are applicable for moderate temperature uses, according to Gonser, current interest in high temperature processes has brought about interest in protective coatings for service at more elevated temperatures. The most generally suitable processes for depositing or forming coatings of the refractory metals, and other materials such as carbides, borides, silicides, and nitrides are vapor deposition processes. In these processes, a volatile compound of the material which is to be deposited is passed over the work which is heated to a temperature at which the compound is decomposed or reduced at the

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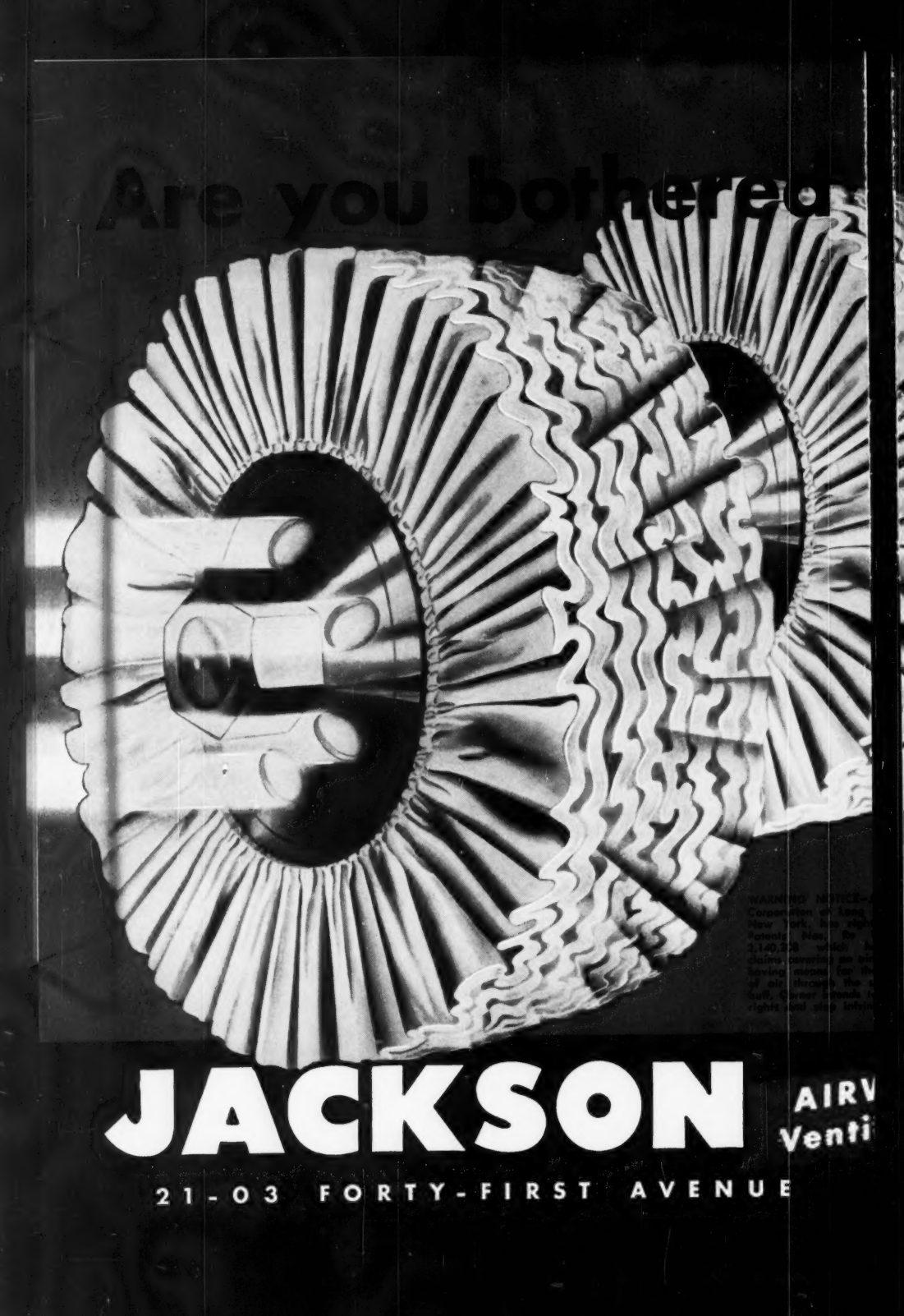
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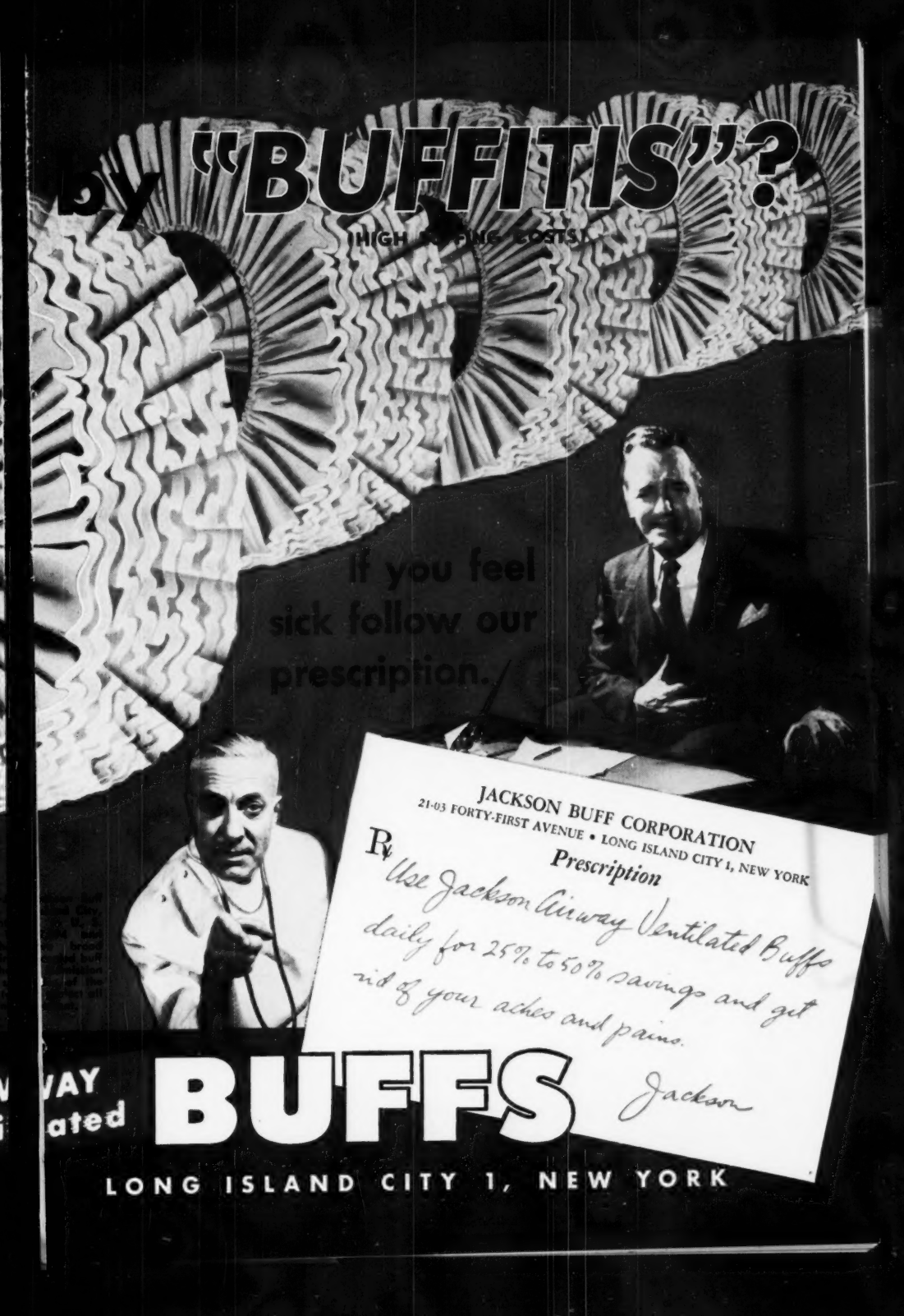
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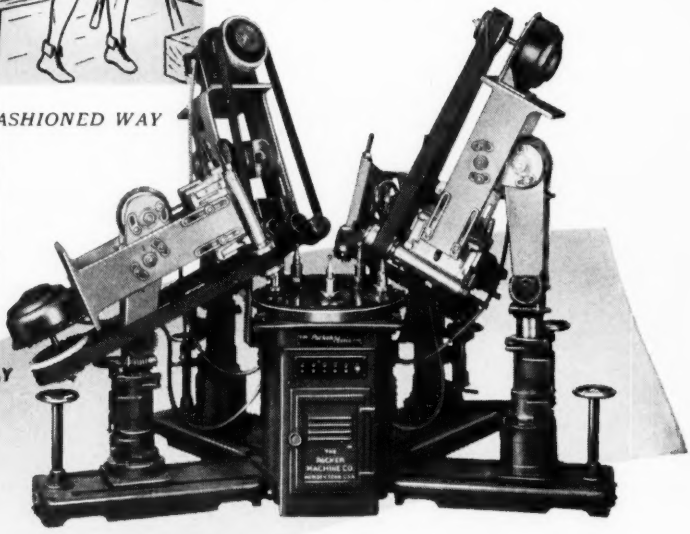

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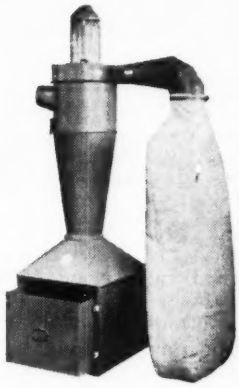

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surface to form an adherent coating. The by products of the plating reaction can either be pumped off, flushed off in a stream of "carrier" gas, or removed by combination with a mass of heated metal included in the system. This method should not be confused with the commercially used evaporation process for coating applications which will be discussed in a subsequent section of this review.

The vapor deposition processes can be used to deposit coatings of the most refractory materials at temperatures far below their melting points or at temperatures where their vapor pressures are negligible. Coatings varying from less than a micron to several millimeters in thickness can be formed in a few minutes or several hours. It was pointed out by Gonser that most vapor deposition processes can be carried out either in a vacuum or at atmospheric pressure, and they always involve a chemical reaction at the plating zone. Coatings made in this way at high temperatures are frequently more adherent and stable under high temperature operation than materials deposited at low temperatures by other means.

Vapor deposition consists essentially of reducing or decomposing a volatile compound of the coating material upon the surface of a heated body. One plating method used is chemical reduction or reaction at the surface, which includes: (a) hydrogen reduction of halides; (b) reaction of halides with a gas containing carbon, nitrogen, boron, silicon, or oxygen; (c) displacement or reaction of the base material with one of the constituents of the gas phase. The other plating method is thermal decomposition at the surface, which includes: (a) reactions at high temperatures, such as the halides and oxygen-containing compounds, and (b) low temperature reactions, as represented by the carbonyls and hydrides.

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Given in Fig. 3 is a flow chart for vapor deposition by hydrogen reduction. Table I lists a number of metals that have been deposited using vapor methods; coatings of carbides, nitrides, borides, silicides, and oxides have also been produced by similar methods. (See also "J. Electrochem. Soc." Nov. 1949)

According to Gonser, all the metals with the exceptions of osmium, ruthenium, and iridium can be deposited in ductile form. They can be made hard and brittle, however, by the addition of traces of carbon, oxygen-nitrogen, or hydrogen compounds to the plating atmosphere. Of the several factors which influence the nature of the deposit, the specimen temperature seems to be most important. Lower temperatures usually favor more finely crystalline deposits and high temperatures more coarsely crystalline deposits. Deposition rates vary with the material deposited and the process used. Hydrogen reduction of certain metal halides proceeds at 7.5 to 65 microns per minute, but in some cases, particularly with the thermal decomposition processes, much lower deposition rates are obtained. The average deposit runs from 25 to 250 microns in thickness, depending upon the type of service required of the coating.

A wide variety of products and materials have been coated by vapor deposition methods in the Battelle laboratories. Coatings have been applied to wire, rod, tubing, and strip as well as numerous other articles. Although most of the work has been carried out as a batch process, certain of the refractory metals, such as columbium, tantalum, molybdenum, and tungsten

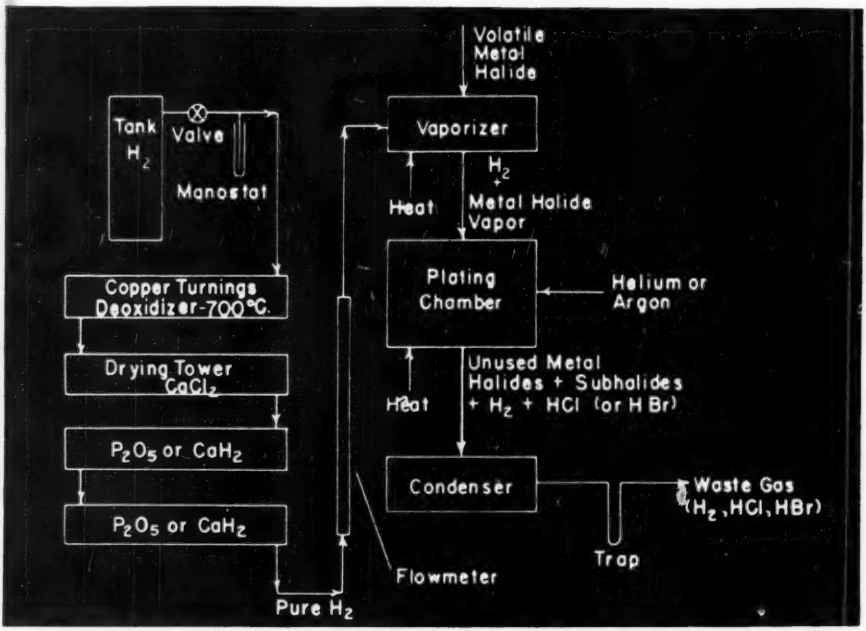

Fig. 3—Flow chart for vapor deposition by hydrogen reduction based on work carried out at Battelle Memorial Institute and reported before the Electrochemical Society.
(Illustration courtesy Electrochemical Society)

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have been coated on iron, copper, and molybdenum wires in diameters from 0.125 to 1.5 mm. by a continuous-flow process. The hydrogen reduction process has been developed for depositing

TABLE I

Metals That Have Been Vapor-Deposited in Battelle Laboratories

Metal	Melting Point °C.
Tungsten	3410
Rhenium	3170
Tantalum	3000
Osmium	2700
Molybdenum	2620
Ruthenium	2500
Iridium	2454
Columbium	2415
Tantalum-columbium alloy	2300
Hafnium	1700-2230
Rhodium	1966
Chromium	1890
Ziconium	1860
Thorium	1830
Platinum	1773
Titanium	1725
Vanadium	1700
Uranium	1130
Tantalum-titanium alloy	—
Tantalum-zirconium alloy	—
Chromium-molybdenum alloy	—

columbium, tantalum, molybdenum, and tungsten on commercially useful articles but has not been exploited commercially as yet.

Chromium diffusion coatings produced by chromizing using chromous chloride are finding use for improving corrosion resistance in many applications. In this connection reference was made to recent work reported from the Battelle laboratories on salt bath methods as compared with pack methods ("J. Electrochem. Soc." Oct. 1949). A variety of ferrous materials have been satisfactorily chromized at temperatures from 900 to 1200 deg. C. by immersion in fused salt baths containing from 5 to 30 weight per cent chromous chloride. A typical chromizing salt bath consists of 30 per cent chromous chloride; 49 per cent barium chloride and 21 per cent sodium chloride. The chromous chloride may be prepared at the point of use by the reduction of chromic chloride with chromium metal. Smooth, non-porous, deformable chromized cases, which are resistant to nitric acid attack for several months, can be produced by this method. The siliconizing of iron in a silicon chloride —hydrogen atmosphere has been used to increase the corrosion resistance by producing a silicon-containing case.

In many applications, although the body of an object is not excessively heated, it fails through progressive attack initiated at some point in a thin skin at a heated surface. Vapor plating with a thin film of a high-melting material resistant to oxygen, nitrogen, or water vapor helps to avoid this. Hard, erosion resistant surfaces are required in some applications. The carbides, nitrides, and especially the borides of certain metals (especially those in Table I) would produce such surfaces.

Carbonyl Gas Plating

The decomposition of metal carbonyl gases was one of the methods described by Gonser as being applicable to vapor-deposition techniques. The Commonwealth Engineering Company has recently been working along the lines of a process for nickel plating objects of various sizes, shapes, and materials based on the use of carbonyl gas. According to Commonwealth, the metal carbonyls are excellent starting materials for gas plating. Nickel carbonyl, for example, is readily vaporized in carrier gases such as carbon dioxide, nitrogen, or hydrogen. Its freezing point is -30 deg. F., its boiling point 115 deg. F. and its decomposition point is approximately 356 deg. F. It is stated to be stable liquid which is handled in commerce in regular pressed steel cylinders.

There are three primary determinants in controlling the final metal deposit. As given by Commonwealth engineers, these are: concentration of metal compound in the carrier gas; rate of flow of the plating atmosphere;

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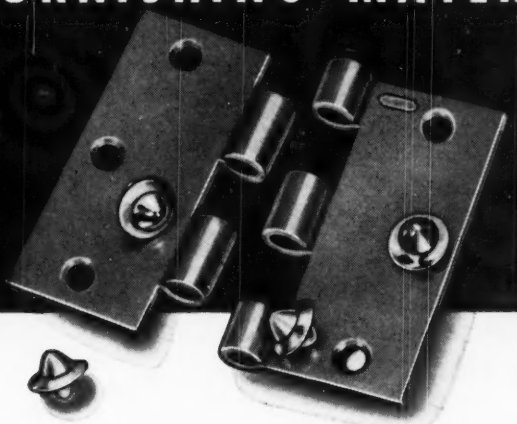

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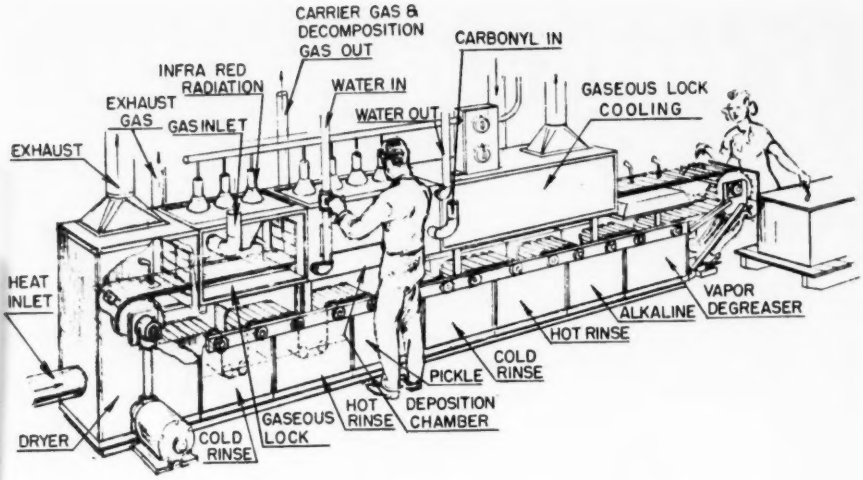
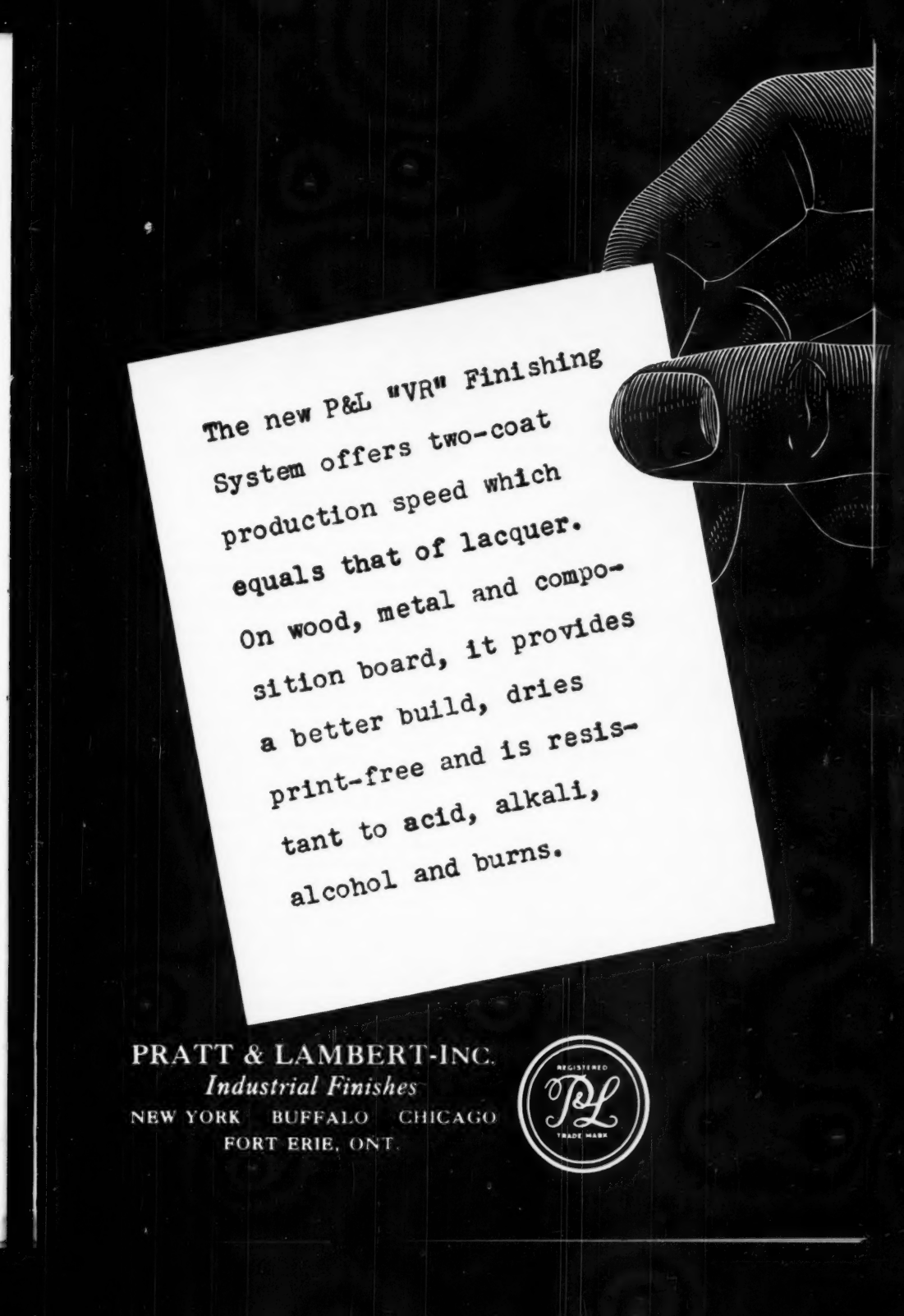


Fig. 4—Approximate size and arrangement of a commercial unit for gas plating using the carbonyl process; the method is adapted to continuous operation. (*Illustration courtesy Commonwealth Engineering Company of Ohio*)

temperature of the objects to be plated. Each of these controls enables the operator to regulate the operations with regard to density of plate, speed of plating and ductility and thickness of the plate.

One application for gas plating that has been described by Commonwealth is the case of nickel plating gasoline fuel delivery nozzles. Figure 4 shows the arrangement of such a gas plating assembly. The fuel delivery nozzles are conveyorized before entering the preparatory operation prior to plating. If the article permits, a clean metal surface may be obtained through the use of a reducing atmosphere furnace. The conveyor rack passes through a gas lock zone and enters the plating zone. Either in the gas lock zone or in the first stage of the plating chamber, the nozzles are brought up to the plating temperature. Dielectric, induction, or radiation methods of heating may be used. The parts pass through the plating chamber at a predetermined rate to obtain the desired metal thickness, and into the exit gas lock where they may be cooled to facilitate manual handling. An operator removes the plated parts from the conveyor line and feeds on unplated nozzles to go through the cycle.

In this case, plating conditions in the chamber are adjusted to give a residence time of thirty seconds or less depending upon the type and thickness of the required coating. With gas plating, it is possible to deposit films of metal 0.001 inch thick in 3 to 5 seconds. Probably the greatest single advantage of this new plating process is the increased rate of deposition. The excellent reproduction or irregular surfaces, internal areas, and complicated structures are other advantages of interest to the metal coating industry. Because of the toxic effects of gas plating vapors on the human body, gas tight equipment must be used and proper provisions made for disposal of waste gases. The process is also applicable to the plating of continuous materials, such as wire, strip, and screen.



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Irregular surfaces as well as the insides of objects may be plated without the use of special machinery or equipment. Gas plating may be the specific answer to the problem of plating objects made by powder metallurgy. It has been postulated that the penetration of the pores of the metal, and the interstitial deposition of gas plating metals may actually enhance the physical characteristics of powdered metal parts.

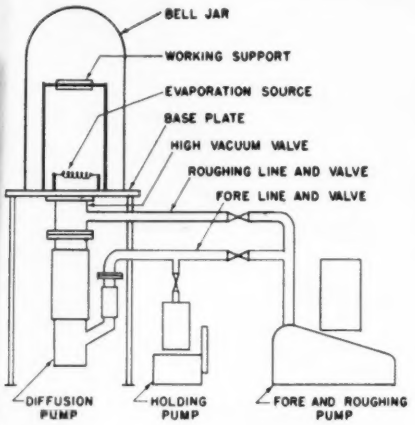

Fig. 5—Typical setup for applying evaporated metal coatings. Large commercial units employ the same basic principle.
(Illustration courtesy National Research Corporation)

Coatings By Vacuum Evaporation

Vacuum evaporation is still another method for producing metal coatings by means other than electrodeposition. It has been shown that almost invariably surfaces produced by this process have a greater brilliance than depositions either by electrolysis or as paint. These surfaces are produced without hand finishing or buffing, provided the finish of the original surface is in satisfactory condition. Extremely thin films can be formed; also, metals can be applied to non-conductors without resorting to special chemical or physical treatments. Materials can be coated which could not otherwise be coated if high temperatures or chemically destructive compounds were required, as is the case in some other processes. One metal can be deposited on another that is far removed from it in the electrochemical series; for example, gold or platinum can be deposited directly on aluminum or magnesium.

Vacuum coating is economically feasible for many finishing operations. It is used to impart a gleaming metal surface to hair barrettes and costume jewelry. It may be applied to many surfaces, such as glass, plastics, metal, or crystals. Any substance which retains its solid state and does not have too high a vapor pressure under high vacuum is amenable to vacuum coating.

Other recent uses for evaporated metal coatings include molded plastic parts for decorative purposes such as Christmas tree decorations, automobile horn buttons, and plaques. Thin plastic sheeting can be coated with metals. Aluminum and silver coatings on both glass and plastic parts have been reported to reflect well over 80 per cent of the incident light. For other uses alloys and elements such as tellurium, silicon, and selenium can be deposited on a surface in very thin layers. Figure 5 shows a typical setup for applying evaporated metallic coatings; large commercial units employ the same basic technique. Figure 6 shows an evaporator manufactured by the National Research Corporation for applying metallic coatings by the batch method. This unit can be evaporated by its pumping system in about 15 minutes. The evaporation itself requires about 1 minute, and release of the vacuum requires another minute. The loading and unloading time vary with the type of object being handled and the jigging procedure.

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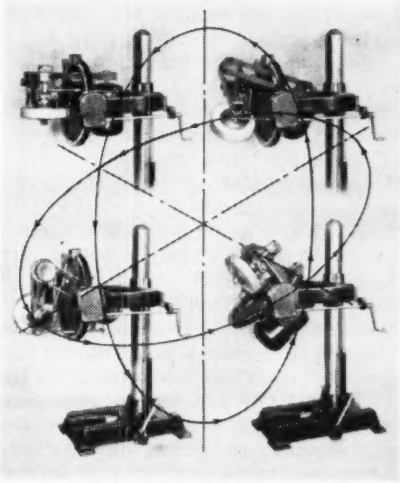

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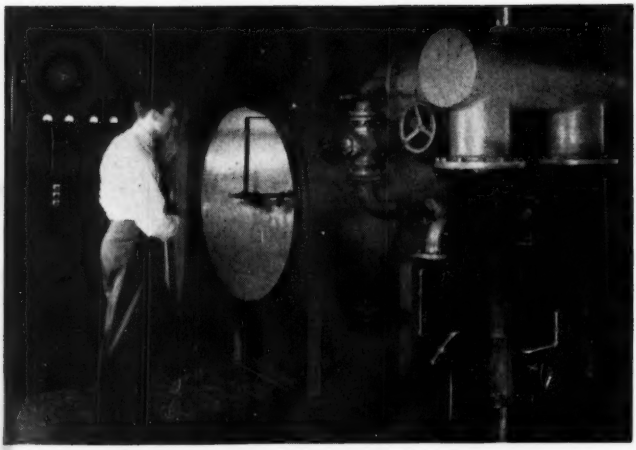

Fig. 6—An evaporator manufactured by the National Research Corporation for applying metallic coatings by the batch method using vacuum techniques. *(Photo courtesy Vacuum Engineering Div., National Research Corporation)*

Distillation Products Inc., another manufacturer of vacuum coating equipment. This machine, a view of which is shown in Fig. 7, can be handled at one station by one operator; automatic devices carry out all operations. While one bell jar is being loaded, the previous one is rough-pumped by a mechanical pump, and ten are being pumped to high vacuum. In the subsequent positions, the filament is degassed, the charge of coating material is melted, and finally the metal is vaporized. At the last position, the bell jar is released to atmosphere pressure, unloaded, and made ready to receive a new batch of work and a fresh charge of coating material. One bell jar delivers a finished batch of work in 30 seconds to 3 minutes, depending on the volatility of the work being coated and other factors. Thus, a total of 20 to 120 batches may be processed every hour. The number of pieces produced per hour depends, of course, on their size and shape. Production rates of several thousand pieces per day are realized.

Some of the materials now being applied by vacuum coating methods include aluminum, copper, gold, Inconel, nickel, silver and zinc. It is reported that one manufacturer uses vacuum coating to deposit pure gold in the recesses that form the initial in plastic inserts for tie clasps. In this case, the use of the vacuum process in regular production gave a finished product measurably superior to the former which had been made by painting with a spray gun, and at no increase in cost. Automobile manufacturers use this same method to prepare brilliant metallized plastic parts for steering wheels and dash panels. The brilliant luster of evaporated metal adds much to the attractiveness of emblems and insignia for radios, refrigerators, and other household appliances. Molded parts such as equipment name plates, appliance escutcheons, and similar articles are adapted to the vacuum process.

Sprayed Metal Coatings

Sprayed metal coatings are used principally for corrosion resistance; however, some decorative applications have been reported. The chief advantages of metal spraying are the much greater rate at which the coatings are formed, in comparison with other methods of metal coating, and the portability of the equipment, which permits the coating of objects too large to be treated by other methods. The process is particularly suitable for coating large structures in applications

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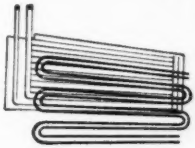
Replaces Pipe Coil

LESS MAINTENANCE

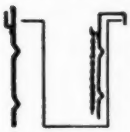
Weighs less than half as much as equivalent pipe coil. Platecoil is easy to handle. Installation can be made in ½ hour by one man and a helper.

MORE PRODUCTIVE CAPACITY

Platecoil has more prime surface per sq. ft. of area than pipe coil, heats faster, and leaves more tank space for production work.



NO LOSS OF SOLUTION



Platecoil can be removed from outside of tank in a matter of minutes without dumping. All connections above liquid level.

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Division
KOLD-HOLD MFG. CO.
LANSING 4, MICHIGAN

Why Platecoils Cost Less

LOW FIRST COST

The initial cost of Platecoil is often 50% or more below the cost of equivalent pipe coil depending, of course, on the materials used in construction.

EASY INSTALLATION

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NO THREADED JOINTS IN TANK

The entire Platecoil is electric welded and pressure tested. There are no joints to corrode or leak. Both connections to the Platecoil can be located above the liquid level where there is no danger of thread corroding and freezing.

GREATER TANK CAPACITY

A 22" x 47" Platecoil gives the same heat transfer surface as 32 feet of 1½" pipe. This pipe requires a space approximately 30" x 60". Platecoil thus saves about 50% over equivalent pipe coil.

WEIGHS 50% LESS

Weighing only about half as much as equivalent pipe coil, Platecoil is easy to handle. A whole maintenance crew is not needed to transport and install Pipecoil.

TANK MAINTENANCE WITHOUT LOSS OF SOLUTION

There is no need for workmen to get inside the tank in order to make replacements or repairs. A Platecoil can be removed in a matter of minutes with the solution still in the tank.

LITERATURE

The new Platecoil Bulletin furnishes a complete description of the Platecoil method of tank heating. Write for your copy today.

HIGH BTU TRANSFER

More prime surface of Platecoil can be installed in a given area than can be obtained with pipe coil. Thus a more compact Platecoil unit provides much greater BTU transfer per unit area than can be obtained with pipe coil. Quick starts in heating tank solutions mean more hours of productive time.

Kold-Hold Manufacturing Company, Lansing 4, Michigan

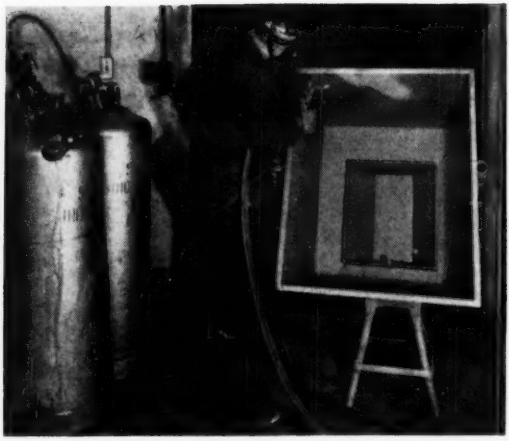

Fig. 8 — A degreasing tank being sprayed with 0.015 inch of zinc to protect the steel against corrosion. *(Photo courtesy Metallizing Engineering Company, Inc.)*

where protection against corrosion is an important factor. Other uses are based on the utility of this method for applying thick coatings to a limited area. The process has also been used in coating nonmetallic materials, for a variety of uses, some of which would be classified as ornamental. Figure 8 shows a degreasing tank being sprayed with 0.015 inch of zinc to protect the steel against corrosion.

The bond between the sprayed coating and the base material to which it is applied depends on the following factors: (1) the base material must be properly roughened to form keys or openings for the sprayed metal to penetrate, thus binding or keying the two materials together; (2) the base material must be clean and free from oxides, oil, or water, which would form a layer between the sprayed metal and the base material, making it impossible for them to come into the intimate contact required for proper bonding; (3) the sprayed metal must be finely atomized, so that the molten particles are small enough to penetrate the smallest openings of the prepared base material, and so bond to it. The above three factors should always be given careful consideration since they are the basis of sound metal spray finishing operations.

Metal spraying is an excellent means of protecting iron and steel from corrosion; heavy coatings of zinc or aluminum can be sprayed and will give 15 to 20 years' life without further maintenance. Given below are results of salt spray tests conducted by Metallizing

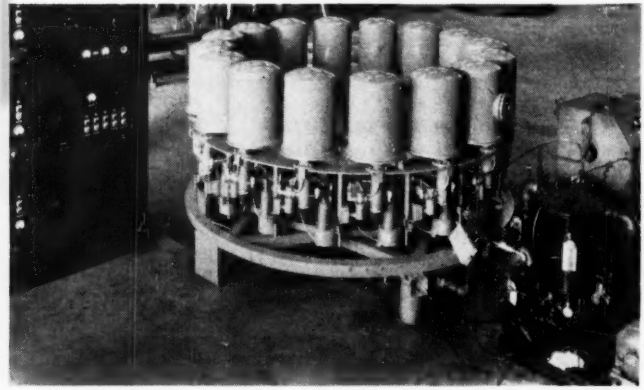

Fig. 7—An automatic rotary vacuum coating machine developed by Distillation Products, Inc. One bell jar delivers a finished batch of work in 30 seconds to 3 minutes, depending on the process. The entire machine can be handled at one station by one operator. Commercial production rates of several thousand pieces per day are being realized. *(Photo courtesy Vacuum Equipment Div., Distillation Products Industries)*

In the modern NUTONE plant

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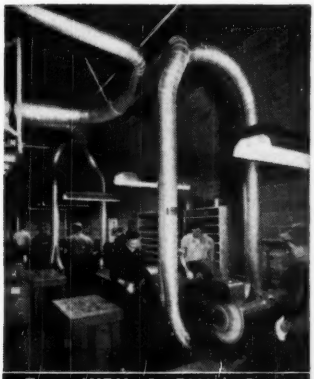
- 2 DUST CONTROL SYSTEMS
- DEGREASING AND ACID ETCHING VENTILATION
- PAINT SPRAY BOOTHS (INSTALLED ONLY)
- PAINT DRYING OVEN AND CONVEYOR
- MAKE-UP AIR SUPPLY SYSTEM

A variety of problems in the Finishing Departments of NuTone Incorporated, were solved by KIRK & BLUM Engineers. Shown here are the various installations which were designed, fabricated and installed by KIRK & BLUM.

Of special importance is the "Make-up" Air Supply System which filters, heats and replaces air exhausted by the other systems, eliminating undesirable winter drafts.

The wide experience of the KIRK & BLUM organization is at your service. "Clean Air . . . the Invisible Tool" can do much to increase the efficiency of your operations. For more details and literature, write The Kirk & Blum Mfg. Co., 2816 Spring Grove Ave., Cincinnati 25, Ohio.



Two KIRK & BLUM Dust Control Systems serve the polishing and buffing room.

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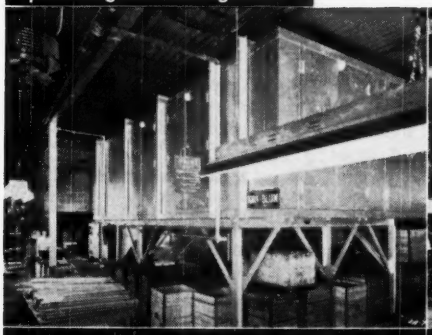
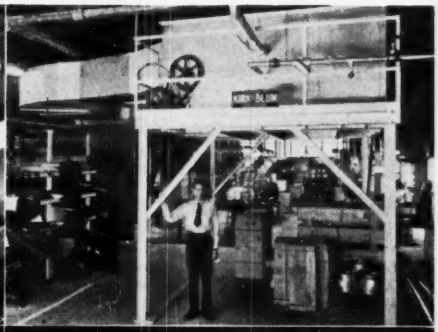


Overhead conveyorized Paint Drying Oven installed complete by KIRK & BLUM.



"Make-up" air supply system replaces air exhausted from plant.

Engineering Company on heavy zinc and aluminum coatings. In all cases, it was reported that the coatings were still in perfect condition after the number of hours shown for the particular metals and thicknesses.

Hours in Salt Spray Test	Thickness	
	Zinc inch	Aluminum inch
700	.002	.003
1600	.003	.004
2500	.004	.005
4000	.006	.006

Indications are that metal spraying is being increasingly used for decorative and corrosion protection. Some applications that have been reported are: coating ordinary steel tubing with brass for the manufacture of hand rails and door handles; stainless steel on elevator push-button panels; stainless steel on laboratory receiving table tops, and wheeled sample tables. Brass on steel, as sprayed on a coarse sand-blasted surface, produces an efficient anti-slip stair tread.

* * *

Combating Checking and Frosting in Organic Finishing Operations

AT the Drying Oil Symposium held by the Division of Paint, Varnish, and Plastics Chemistry at the 1949 Fall convention of the American Chemical Society, H. Dannenberg, J. K. Wagners, and T. F. Bradley, Shell Development Company, Emeryville, Calif., presented practical information with reference to avoiding checking and frosting in finishing operations. Among the points brought out was that the industrial finisher should devote particular attention to the removal or minimization of dust contamination in the atmosphere in which coating compositions are applied and permitted to dry. These corrective measures to combat this troublesome phenomenon of frosting and checking may be most feasible in the case of industrial baking ovens where absence of efficient dust filters or improper regulation of gas burners may consitute important sources of trouble which are readily capable of correction.

According to these Shell Development Company workers, the tendency of drying oils such as tung, oiticica, dehyrated castor oil, partially conjugated linseed or soybean oils, and varnishes or alkyd resins made from these oils to dry with frosted, finely wrinkled or finely checked surfaces is a troublesome phenomenon which constitutes one of the major objections to the use of such products for many applications. Although this tendency has been recognized to be largely confined to compounds which contain conjugated carbon-to-carbon double bonds, and

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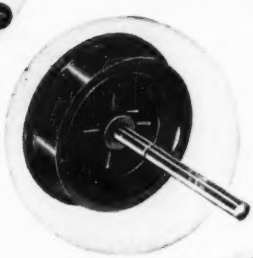

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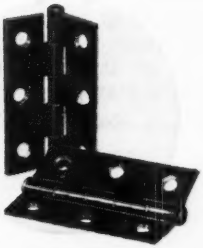

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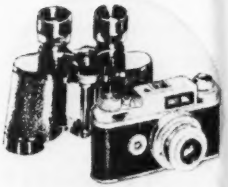

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to be capable of modification or elimination by the use of sufficiently high varnish-cooking temperatures or in some cases by the addition of large percentages of certain phenolformaldehyde resins, it was pointed out that relatively little is known concerning the cause of this phenomenon and its true nature. Their laboratory study involved, among other materials, a study of a tung-oil ester-gum varnish, a commercial alkyd resin on a dehydrated castor oil base, and a laboratory prepared varnish on a dehydrated castor oil base. The latter material was prepared using a low temperature of reaction in order to accentuate the checking and frosting effects under study.

The experiments showed that the deposition of solid particles of very small size on the wet film or on a film that is just beginning to set induced checking and frosting. These materials appeared to be the same as what we normally call dust or smoke. Surface active agents, which were described as including certain phenols, phenolformaldehyde resins and their calcium salts, and calcium octoate, when added in small amounts were found to overcome the normal effect of dust. Thus, in addition to what is already known with reference to manufacturing practice the following practical suggestions were made to assist in control of checking and frosting in finishing operations: (1) avoid exposure of freshly coated surfaces to dusty or smoke-laden air; (2) adjust burners in baking ovens in such a way that no soot is formed; (3) the addition of a small amount of certain surface active agents to the varnish in order to decrease the initial surface tension has been found helpful. As little as 0.1 per cent calcium octoate was found to have a marked effect.

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The "old shoulders" are the Marschke Polishing Stands, known for years as tops in their field. The line is big, to fit your problem, from 1 HP to 15 HP, single or double end, with or without variable speed control, etc. Ball-bearing spindles, never whip, turn out quality work.

The "new head" is the Vonnegut Brush-Backed Polishing Head (shown) that makes cutting, smoothing or finishing of contoured and other odd-shaped surfaces a cinch, either to prepare for or after the finish is applied. Describe YOUR pet stumbling block, maybe we can help you?

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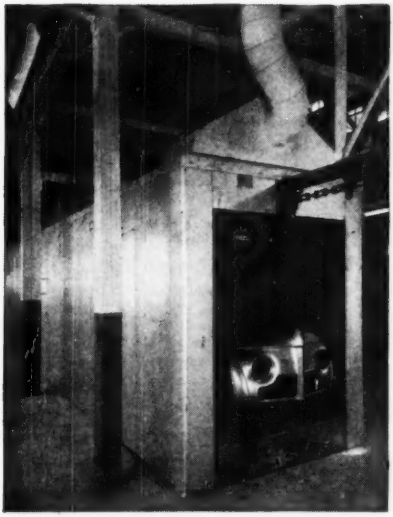

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Preparation of High Carbon Steel for Plating

MOST platers realize that the plating of high carbon steel parts, such as springs, washers and so on may present problems not ordinarily encountered in similar operations on low carbon steel. A tentative recommended practice intended as an aid in establishing cycles for the preparation of high carbon steel for electroplating was accepted by A. S. T. M. at its 1949 meeting. This recommended practice is intended to reduce hydrogen embrittlement to a minimum and to secure maximum adhesion.

A number of general points brought out in this recommendation are of interest to platers having trouble with such operations. Surface treatment of parts is important and must include the removal of oil, grease and caked-on dirt by precleaning before the part enters the plating cycle. This may include mechanical methods of surface preparation such as sand or grit blasting. However, in all cases, the pretreatment cycle should include an anodic treatment in an electrolytic cleaner. This cleaner should be used at a temperature of 190 deg. F. or higher, and at a current density of 50 amp./sq. ft. or higher, in order that the required degree of cleanliness can be obtained in a time period not exceeding 2 minutes. One exception to this rule is barrel work, which, because of the work size, is preferably cleaned by soaking or tumbling in an alkaline cleaning solution without the use of current. On removal from the cleaner the work should be thoroughly rinsed, first with water at 120 deg. F., and then in a cold water spray at room temperature prior to the acid dip.

Following cleaning, a hydrochloric acid dip is the recommended practice. The intensity of this treatment should be held to the minimum as required to remove the last traces of oxide and scale. Sulfuric acid is not recommended for pickling high carbon steel. It is best if the acid dip be avoided for spring temper and case hardened parts. Any smut resulting from the above treatment should be removed. A cyanide dip consisting of 3 oz./gal. of sodium cyanide has been found useful for many smut conditions. Where a severe smut condition exists, it can be eliminated by a ½-1 minute anodic treatment at 15-20 amp./sq. ft., in a solution of 6 oz./gal. of sodium cyanide used at room temperature.

Standard plating procedures can be used on high carbon steel if proper pretreatment has been employed. As a general rule, tin and cadmium are easier to deposit on such steels than zinc. Nickel and chromium can be plated without difficulty. It is important that springs and similar materials not be plated while subject to externally applied stresses. Although the recommended A. S. T. M. procedure minimizes hydrogen embrittlement, in many cases of commercial production it is necessary to bake the work for final embrittlement relief. The hydrogen may be largely removed and the physical properties of the steel substantially restored by heating for a period of 1-5 hours at temperatures between 300 and 500 deg. F., baking as soon as possible after plating. For cadmium and zinc plated parts the treatment temperature should not exceed 400 deg. F., if the coating is to be given a particular chemical treatment.

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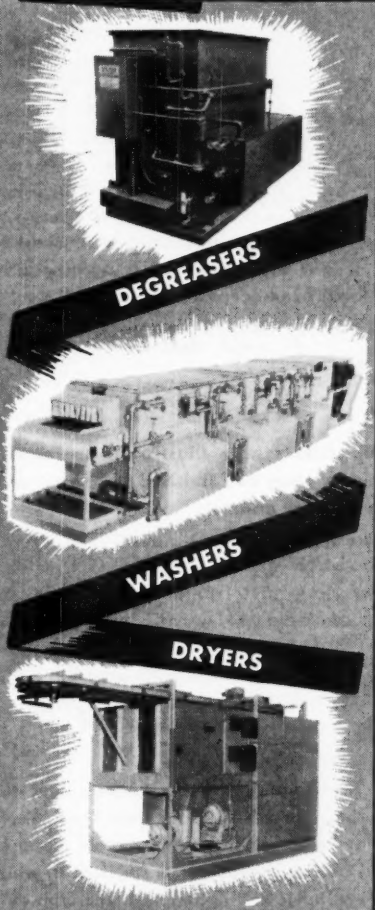

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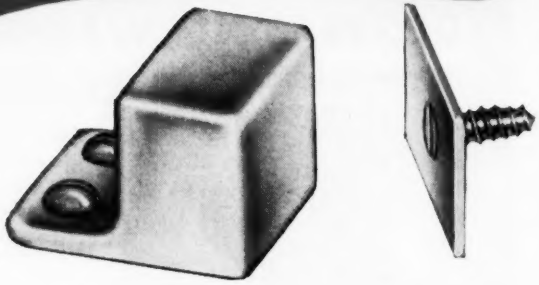
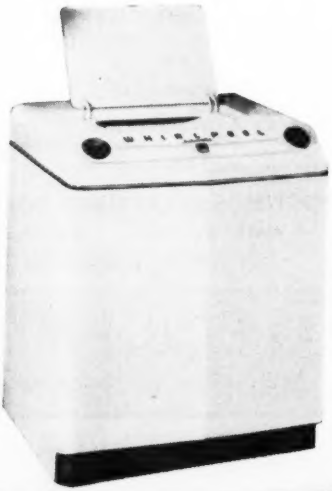


● The Leco-Latch here illustrated is finished in gleaming bright nickel and is a permanently magnetic latch used for cabinet doors.

(Photo courtesy Laboratory Equipment Corp., St. Joseph, Mich.)

● The Moldcast Floodlights here illustrated are manufactured from aluminum alloy and finished in Lawn Green or Baked Aluminum outdoor enamel.

(Photo courtesy Moldcast Products, Inc., Newark, N. J.)



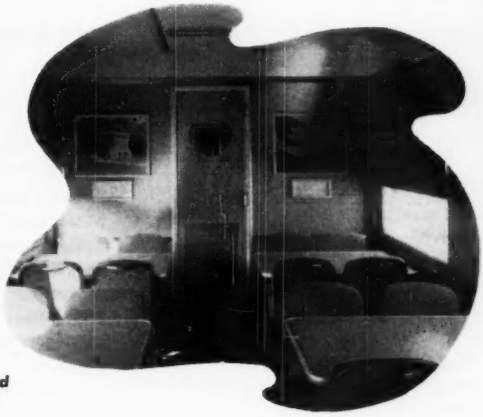
● The tub, spinner basket, and top ring of the Whirlpool Automatic Washer are finished in porcelain enamel. The outside cabinet is finished in white synthetic baking enamel. The trim strip separating the top assembly from the main cabinet of the washer is polished stainless steel.

(Photo courtesy Nineteen Hundred Corp., St. Joseph, Mich.)

that aid in appearance and utility

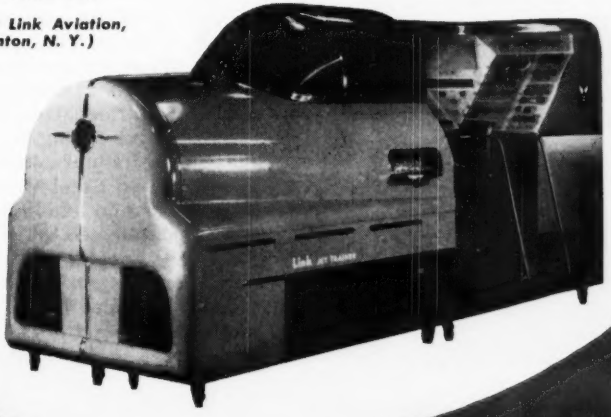
● **The interior of the parlor-cafe car here illustrated has been painted with Du Pont Dulux sprayed over the copper bearing steel. The light trough, picture frames, door frames, and sash frames have been fabricated from extruded aluminum and anodized. Table tops are Formica with anodized aluminum edging.**

(Photo courtesy American Car and Foundry Co., New York 8, N. Y.)



● **Outside paneling on the Link Jet Instrument Trainer is aluminum, anodized, primed with P-70 Pri-Met, sprayed with a gray sanding surfacer, water sanded with No. 400 sandpaper, and finished with two coats of lacquer in maroon and gray. The hood is finished in metalescent blue. All molding is satin-finished aluminum.**

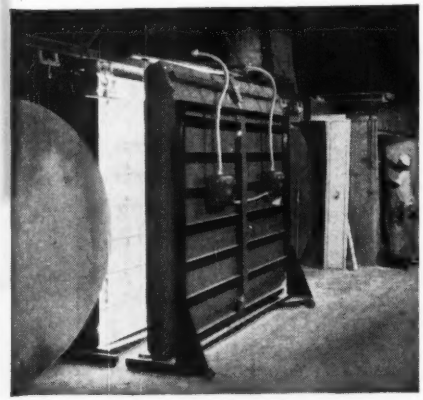
(Photo courtesy Link Aviation, Inc., Binghamton, N. Y.)



PRACTICAL APPLICATIONS *of Modern Products*

Infra-Red Dries Porcelain Enamel Rapidly

FINISHING of metal products in porcelain enamel is a two-stage operation, from the standpoint of industrial heating. After the porcelain enamel frit, milled to less than 200 mesh fineness in a water slurry, is sprayed on the products in process, a drying operation to remove the water from the wet, sprayed surface is in order. For this operation, conducted in the temperature range of 250 to 500 deg. F., infra-red ovens can be utilized. After the water is dried from the articles in process, the resulting enamel bisque is then fired in high temperature furnaces at 1300 to 1550 deg. F. to form the familiar fused glossy porcelain enamel surface.



View of the infra-red oven used to remove moisture from sprayed porcelain enamel. (*Photo courtesy The Fostoria Pressed Steel Corp., Fostoria, Ohio*)

One example of the way in which manufacturers of signs, home appliances, bath tubs, and similar items can use infra-red for the frit drying operation is in evidence at the plant of the General Enameling & Manufacturing Company of Chicago. In this plant the porcelain enamel slurry is sprayed on 72-inch diameter metal signs in much the same way as paint would be applied. The signs are permitted to remain in room temperature air for one minute, and are then processed through a 7¼-foot infra-red oven. In this operation the wet porcelain enamel is dried in one minute, after which the sign is ready for the high temperature firing operation which fuses the frit into a hard glossy surface.

The processing operation here described briefly is a completely conveyorized cycle, so planned that various colors of porcelain enamel may be employed without interrupting the normal process flow. The infra-red equipment used for drying the wet porcelain enamel was manufactured by The Fostoria Pressed Steel Corporation, Fostoria, Ohio, and has improved the drying speed, reduced the drying cost, and assisted in keeping the area around the drying oven much cooler than was previously possible. These factors, in addition to the fact that this equipment contributes to shop cleanliness, are re-

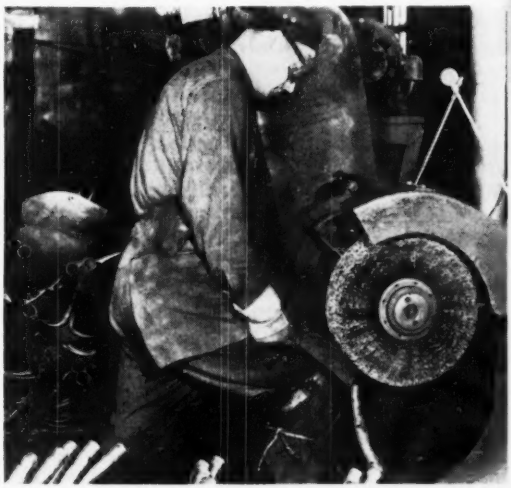
sponsible for the popularity of the equipment in the General Enameling & Manufacturing plant.

Power Brushing Used for Cleaning Shovel Blades

IN the manufacture of long-lasting scoops and shovels, one of the most important operations is that of thoroughly cleaning the blades after the heat treating operation and prior to the painting operation. The American Fork and Hoe Co. of Conneaut, Ohio, manufacturer of this type of shovel equipment, is using a method of power brushing in performing the cleaning operation on a production line basis.

As may be seen in the accompanying illustration, the blades are applied to the brushes by a manual method, the brushes being mounted on a polishing machine of the double spindle, V-belt drive type which is powered by a 5 h.p. motor. The brushing equipment is supplied by The Osborn Manufacturing Co. of Cleveland. Seven 18-inch diameter Monitor wire wheel brush sections filled with 0.0104 inch crimped economy wire are used. The brushes are rotated at a speed of 2,400 r.p.m., and a typical cleaning operation may be completed in just 16 seconds. Thus, the blades may be cleaned at the rate of 18 dozen per hour, and approximately 7,000 blades may be cleaned before it is necessary to replace a set of brushes.

The scoop and shovel blades are made in 15 gauge high carbon steel, and they are heat treated and hardened for extra strength. With the present method of brushing, all oil quench, heat scale and accumulated rust and dirt are removed in preparing the blade surfaces for the application of an asphalt base paint.



The illustration shows a method of power brushing being used to clean a typical shovel blade.

Special coatings for refrigerators have been devised by the scientists of the paint and finish industry. Such coatings must give protection against high humidity, low temperatures and the corrosive effects of food acids.

Koch Finishing Equipment. George Koch Sons, Inc., Evansville 4, Ind., has available a two-color 12-page manual illustrating and describing its complete industrial line, from the smallest to the largest unit. The new Gyra-Flow finishing process is discussed, as well as cabinet ovens, accessory equipment for cabinet ovens, truck type ovens, dry spray booths, Acme water wash spray booths, and mechanical washers for cleaning and phosphate coating.

Finishing Clinic

In this department are presented some of the questions submitted by readers together with suggested solutions of the problems outlined.

Question. *Please suggest some simple processes for blackening brass, aluminum, and steel parts.* *C. F. N.*

Answer. For brass, the following three processes might serve your purpose satisfactorily:

(1) copper carbonate _____½ oz./gal.
concentrated ammonia 4 oz./gal.
soda ash _____¼ oz./gal.
temperature _____190-200 deg. F.

(2) sodium thiosulfate _250 gm./l.
copper sulfate _____75-100 gm./l.

(3) Heat a 5% solution of caustic soda to 212 deg. F. Add 1% of powdered potassium persulfate and immerse the brass object for about 5 minutes. If oxygen gas ceases to be evolved before the object is stained properly, add another 1% portion of the powdered persulfate. When solution is not in use, keep in an air-tight container.

One suggestion offered for the blackening of steel is that the object be painted repeatedly with a solution containing:

tannic acid _____2 gm./l.
tartaric acid _____2 gm./l.

After painting, the object is permitted to dry in air.

One of the following three formulas for blackening aluminum may serve your purpose:

(1) Immerse the object to be blackened in a boiling solution containing:
nickel sulfate _____5 gm./l.
sodium fluosilicate ___ 2½ gm./l.
potassium nitrate ____12½ gm./l.

(2) Dip the article to be blackened for ½ minute in a boiling solution containing 10-20 gm./l. of ammonium molybdate and 15 gm./l. of ammonium chloride.

(3) Aluminum objects may be stained black by being immersed for 20-30 minutes in a solution composed of

the following:

potassium permanganate	5-10 gm./l.
nitric acid	2-4 cc./l.
copper nitrate	20-25 gm./l.
temperature	180-190 deg. F.

You might find that one or more of the following companies have simple processes for blackening metals (names of five companies furnished).

fc

Question. *We are wondering if you are able to give us any information regarding a method of preserving the high mirror finish on polished aluminum. Our product, one portion of which is fabricated from highly polished aluminum, becomes dull through use. Any information that you can forward will be appreciated.* *S. J. S.*

Answer. We should like to suggest that you contact the Aluminum Company of America, 621M Gulf Building, Pittsburgh 19, Pennsylvania, regarding a patented process called the Alzak Process, a brief description of which follows:

High reflecting surfaces may be produced by an anodic treatment in a 2.5 per cent solution of fluoboric acid. The bath may be maintained at about 85 deg. F., and the voltage is approximately 15-30 volts, giving a current density of about 10-20 amps./sq. ft. The process time is 5-10 minutes.

This produces surfaces which reflect some 85 per cent of the incident light and they retain this property under mild exposure conditions for a long while, provided they are cleaned periodically.

The reflecting surfaces produced by electropolishing are usually given a final oxidizing treatment to provide surface protection. The final reflectivity will depend on the purity of the metal and the thickness of the oxide film applied. The final oxidation is generally carried out in a 7 per cent solution of sulfuric acid at a current density of about 12 amps./sq. ft. at a potential of about 20 volts direct current. The exposure time is 10-20 minutes.

It is then desirable to seal the oxide film. This may be accomplished by immersing the parts in hot water at 180-212 deg. Fahrenheit.

fc

Question. *Can you provide information as to the effect of excessive amounts of iron and copper in hard chromium plating solutions?* *R. F. G.*

Answer. A great deal of fundamental research on this matter was performed by Mr. H. Schneidewind at the University of Michigan in 1928 and his results were reported in great detail in the "Transactions of the American Electrochemical Society," Volume 53, p. 499, 1928. The chief point he brought out was these impurities narrow the bright plating range.

More recent information, however, indicates that from a practical standpoint the introduction of iron and copper in a chromium plating solution increases the resistance of the solution and makes necessary an increase in the generator voltage or tank voltage so that the proper operating current density may be maintained. Therefore, as long as you can obtain the current density which you desire, your solution does not have too much iron and copper. When these impurities become so concentrated that you can no longer maintain the current density you wish by applying the voltage available from your generator, then you will have to discard your plating solution. Actually, it is very rare that the amounts of these impurities become great enough to make necessary the discarding of a plating solution.

NEWS of the Industry

NEW PLANTS

Detroit personnel of **UNITED CHROMIUM, INCORPORATED** have moved into new and larger quarters at 1700 E. Nine Mile Rd., Ferndale Station, Detroit 20, Mich. Sales offices, research and analytical laboratories of the company's electroplating division, and a pilot plant are all included in the building.

The research laboratories have been set up along the unit principle with a separate laboratory provided for each distinct research function.

They will carry out intensified research and testing programs on the company's complete line of Unichrome plating processes and materials, including rack coatings, stop-offs, dips for zinc and cadmium, copper plating, and SRHS Chromium Plating. They will also cooperate closely with the company's Organic Coatings Laboratories at Carteret, New Jersey, in testing organic coatings.

The **GRAND RAPIDS VARNISH CORP.**, Grand Rapids, Mich., in announcing a new office and laboratory building, has pointed out that two floors have been assigned to the laboratory's technical staff. Wayne R. Fuller, director of research, in describing the new facilities,

View of one of the new Grand Rapids Varnish laboratories

explained that there are several individual laboratories available for consultation on any problem in the finishing field. Howard C. Lawrence, president of the corporation, further explained the policy of the company with regard to technical service in the statement, "The development, testing, and application of formulas for industrial finishing materials is a highly specialized science."

The laboratories are completely modern, fitted with the latest in analytical and control equipment, both chemical and physical, as well as ovens and various other items of equipment peculiar to the paint industry. The laboratory staff includes 33 technicians, a ratio of more than one technical man to every three production workers in the company.

IMPERIAL PLATING RACK COMPANY, INC., has moved into enlarged quarters at 1613 Industrial Ave., Flint, Mich. According to the announcement by L. D. Faulman, manager, 4000 square feet of floor area is now available for manufacturing plating racks, repairing old ones, and applying insulation to customers' racks.

COMPANIES

PRINCETON PAINT LABORATORIES, Princeton, N. J., developers of Aviation Primer No. 10, have licensed United Chromium, Inc., 51 E. 42nd St., New York 17, N. Y., to handle production and sale of its new organic coating, which is said to eliminate the need for pretreating such metals as zinc, aluminum, magnesium, and stainless steel. The product will be marketed as Unichrome Primer A.P. 10.

SCHAEFER BRUSH MFG. CO., Milwaukee, Wis., has opened its new brush research and development division to all manufacturers and users of brushes to help them solve their cleaning problems. The research division, if necessary, will send an engineer to the job for first-hand information on the particular cleaning problem. However, in most cases by merely sending the cleaning problem with proper information to Schaefer, its research division will be able to develop and recommend a brush suitable to solve the difficult cleaning problem.

Dr. Marcus Thau has announced the organization of **UNIVERSAL COATINGS INCORPORATED** with laboratory and factory at Ten Avenue C, Newark 5, N. J., marking Dr. Thau's 27 years of service to the industry with developments in dyes, synthetic resins, protective and decorative coatings. Among his most important contributions in recent years is the formulation of exterior aircraft finishes designed to reduce friction in flight and thereby increase the speed of planes.

Dr. Marcus Thau

The new company will not only create engineered finishes to meet specific industrial problems but will continue to answer the requirements for enhancing adhesion universally whatever the use and whatsoever the base.

Dr. Thau is a member of the American Chemical Society, and in the New York Paint, Varnish and Lacquer Production Club is the chairman of the sub-committee investigating electrical properties of pigmented films. He is listed in "Who's Who in Engineering" and "American Men of Science."

The second of a series of six Regional Technical Sales Conferences for the field service representatives of the **MAGNUS CHEMICAL CO., INC.,** was held at the Park Hotel, Plainfield, N. J., for representatives in the Middle Atlantic States.

The sessions were conducted by Dave Blanchard, vice president in charge of sales, and were devoted to papers discussing the latest developments in modern methods of cleaning in the many and varied industries served by the company.

The technical discussion was highlighted by a report given by Dr. R. W. Mitchell, technical director, in which he introduced several new products developed as a result of extensive research.

A similar conference was held at Boston for the Magnus representatives in the New England States. Additional conferences are scheduled for Chicago, Cleveland, Atlanta, and Tulsa.

The annual sales conference of **THE CAMBRIDGE WIRE CLOTH COMPANY** was held at the company's home office at Cambridge, Maryland, recently.

The week-long sessions featured the introduction of new products and discussions of existing installations. Greatest emphasis of the conference was placed on the company's wire cloth and wire fabrication facilities which have recently been expanded.

Merger of **HILO VARNISH CORPORATION** and **THE CARPENTER-MORTON COMPANY** of Boston, manufacturers for many years of a complete line of paints, varnishes and enamels, has been announced by Carl J. Schumann, president of Hilo Varnish Corporation.

The operations of Hilo will be continued with the backing of the added experience of the Carpenter-Morton Company.

EDWIN L. WIEGAND COMPANY, manufacturer of Chromolax electric heating units, has announced the appointment of Richards-Conant, a sales engineering organization of Denver, as representative in the Rocky Mountain States.

J. A. Richards came to Denver in 1905 and has been a manufacturer's representative for several mechanical lines for a number of years. A. B. Conant has been affiliated with Montgomery Brothers, Chromolax West Coast representative, for the past 25 qears.

Richards-Conant is located at 324 Cooper Bldg., Denver 2, Colorado.

THE DeVILBISS COMPANY, manufacturer of complete spray finishing systems, conducted a week-long sales conference which brought together its district managers and branch managers from the United States and from subsidiary companies in England and Canada. The meetings with company executives were held at the main plant in Toledo.

A highlight of the sessions was the announcement by Howard P. DeVilbiss, president, of the immediate construction of a modern building adjoining the Toledo plant for expansion and improvement of present extensive facilities for customer services.

HOLLAND SAYS:
START SAVING BY INCREASING PRODUCTION
Spray Booth — Leg and Floor Type. Available in all sizes.
Write for FREE folder "M" showing our wide selection of metal finishing equipment.
J. HOLLAND & SONS, INC.
MANUFACTURERS • DEALERS
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A new division for the rolling of magnesium sheet will be established by **ALUMINUM COMPANY OF AMERICA** at its New Kensington, Pa., works in the near future, the company has announced.

Alcoa has established this new division because of greatly increased demand for magnesium sheet in airplane construction and other phases of the national security program, the announcement said.

J. F. D. Rohrbach, president of **RAYBESTOS-MANHATTAN, INC.**, has announced the new location of its Department of Marketing and Merchandising at the Corporation's executive headquarters, 61 Willett St., Passaic, N. J. This move effects a closer working arrangement with the officials and a desirable expansion of activities under the continued supervision of Franklin A. Miller as director of marketing and merchandising and J. W. Brush, Jr., as assistant.

THE ELECTRIC PRODUCTS CO., Cleveland, Ohio, has appointed Sheldon Storer and Associates as district representatives for the southwestern section of

Ohio and the State of Kentucky.

With offices in Cincinnati, Ohio, Sheldon Storer and Associates will be responsible for promoting The Electric Products Company line of synchronous and induction motors, a.c. and d.c. motors and generators, battery chargers, electrolytic power supplies and frequency changers.

According to a recent announcement, **BACON FELT CO.**, Winchester, Mass., manufacturer of felt wheels and other felt accessories, is celebrating its 125th anniversary this year.

The first scene in the life of the Bacon Felt Company took place in an old grist mill on the banks of the Aberjona River which flows through Winchester, Massachusetts. Robert Bacon of Boston, a hatter by trade, purchased this old mill with its undershot water wheel and converted it into a felt mill. For a few years he continued at his old trade making felt hats but later added other felt products to his line such as wadding, saddle pads, slipper felts, and erasure felts. While the felt hat as known today is usually of rabbit fur, in those days it was made of wool.

The old Bacon Felt Company survived three bad fires to say nothing of the economic bad times to which the country has been subjected over the years. In 1850, operations still being carried on by the Bacon family, were moved to the present location where the company continued to make a variety of felt products.

In 1876 came a revolutionary change in the company's objectives. Charles N. Bacon, grandson of the founder, perfected a method for making felt polishing wheels which he patented. Basically, it is the same method that is used today. Once the making of felt wheels or "hard felts" as they were then called was proved successful, the company discontinued consumer lines and concentrated production on felt wheels, sheet felt, and other industrial felts.

Continuing on under the Bacon family direction and direct supervision, the company expanded its service to industry by broadening its line of wheels and other felt products. During World War I felts for gas masks were produced as well as polishing wheels for industry.

In 1932, after more than 100 years in the hands of the Bacon family, the company was sold to new interests consisting principally of the present owners, Samuel S. McNeilly and Stanley N. McNeilly, who are president and vice president respectively. Samuel is in charge of manufacturing and wool purchases; Stanley is in charge of sales and sales promotion.

Shortly before World War II the company brought out a line of bobs and small wheels for finishing small contoured parts. So it was only natural that during World War II when the airplane became so important, the company was called upon to supply the airplane and parts industries with large quantities of small

Samuel S. McNeilly (left), Stanley N. McNeilly

bobs and wheels of many shapes and sizes.

The McNeilly interests established a laboratory for testing wools, better production methods and uses for felt polishing wheels and bobs. From this laboratory have come new products, such as mandrel mounted bobs and the line of hair felts used in glass manufacturing.

Recently the company purchased a one-story, 50,000 square foot factory in Taunton, Massachusetts—a factory about twice the size of the present plant in Winchester. New processing machinery has been designed and when completed will be installed in the new factory. Plans call for a gradual shifting of production during the latter part of 1950 so that there will be little loss of time. By 1951, it is expected that the changeover will be completed and all production will be carried on in the Taunton factory.

The brand name, "Paramount Brand," established in 1932 will be carried along to Taunton, and all felt products produced by Bacon Felt Company will continue to carry that brand name.

UNITED STATES TESTING COMPANY, INC., has announced the moving of its New York Offices to the McGraw-

Hill Building, 330 West 42nd Street.

The new office will be managed by Thomas C. Ridgway of the Company's Service Division.

The United States Testing Company, one of the largest and oldest independent commercial testing and research organizations, has its main laboratories and offices at Hoboken, New Jersey, and eight other branches throughout the country. Its New York office has heretofore been located at 1450 Broadway.

NEW POSITIONS

Paul Cohen, president of Technical Tape Corp., New York, N. Y., has announced the following changes:

MARC L. LAWSON, formerly sales manager of the company, has assumed the position of director of sales. He is succeeded by **THEODORE F. LAUX,** former assistant sales manager.

LOYAL K. MILLER, former Midwest divisional manager, has been named assistant sales manager with specific responsibility for sales west of the Mississippi.

C. R. HOCKER has been appointed by the General Ceramics and Steatite Corporation as sales engineer and consultant on porcelain processing problems. Mr. Hocker, who was previously associated with the Lapp Insulator organization as its New York representative for the past fourteen years, will cover General Ceramics' home office territory, which extends from the Eastern coast as far west as middle Pennyslvania.

In the Texas and Gulf Coast area, General Ceramics has appointed **THOMAS S. WHELAN, JR.,** of Houston, Texas, as sales engineer. Mr. Whelan will cover all of Louisiana and the eastern part of Texas from San Antonio, east.

Following a recent meeting of the board of directors of the Jones-Dabney Company, Division of Devoe & Raynolds Co., Inc., A. W. Bornhauser, president, announced the election of **J. C. KNOCHEL** as vice president to succeed E. J. Probeck who is no longer active because of ill health.

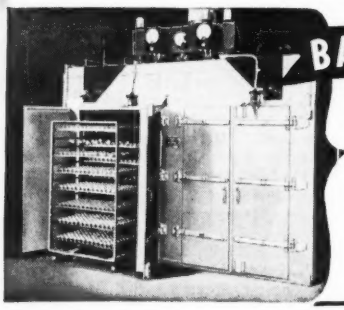
Mr. Knochel will continue in charge of sales of the company's Resin and Grinding Liquids Division, a position he has occupied since joining Jones-Dabney in 1947.

According to an announcement by A. S. Ault, manager of sales and service, Chicago Vitreous Enamel Product Co., Cicero, Ill., **JOHN L. McLAUGHLIN** has become assistant manager of service.

Following his graduation from North Carolina State College in 1937, Mr. McLaughlin joined Chicago Vit, where he spent several years in the research laboratory. After service in the Army, he rejoined the company, and in 1947 was transferred to the service staff.

HAROLD J. LaCASSE has joined Pennsylvania Salt Manufacturing Company's Special Chemicals Department as field sales service representative in the Indiana territory, it was announced by Joseph J. Duffy, Jr., department sales manager. Mr. LaCasse succeeds **JOHN C. HAMPSON,** who recently became sales manager of the department's newly formed Chicago district.

Mr. LaCasse comes to Pennsalt from the Stewart Warner Corporation of Chicago, where he was a material specifications engineer. Previously he was associated with General Electric and Eastman Kodak in electroplating and finishing operations.



BAKING and DRYING OVENS

For Processing • Varnish Baking • Paint and Lacquer Drying • Lithographing and Decorating. Batch or Conveyor Types for any fuel. Write for Bulletin 5.

YOUNG BROTHERS COMPANY

1837 Columbus Road Cleveland, Ohio

Established 1896

The appointment of **FRANK E. HAUFLAIRE** as assistant sales manager of the Chicago Bronze & Color Works has been announced by A. A. Schwartz, president.

Mr. Hauflaire attended De Paul University, after which he was engaged for fifteen years in the retail paint business. His experience includes sales, purchasing, testing and application of dealer paint products. His duties will consist of supervisory office detail and the establishment of improved service to Chicago Bronze & Color Works dealers in Chicago and the Middle West.

Royal A. Brown

According to a recent announcement, **ROYAL A. BROWN** has been appointed to the office of chief chemist at The Egyptian Lacquer Manufacturing Company's New Jersey division, in South Kearny.

The appointment climaxes Mr. Brown's fourteen years in the coatings industry, serving as a formulating chemist, chief chemist, and executive in charge of research and production. He is a graduate of Marietta College.

The appointment of **RICHARD L. HUBER** to the product promotion and market development division of the Cellulose Products Department has been announced by Hercules Powder Company. **FRANK KETCHAM** of the Detroit office will replace Mr. Huber as sales representative in the Cleveland area.

In his new position, Mr. Huber will remain in Cleveland, devoting his time primarily to market potentials in the Middle West. A graduate of Lebanon Valley College, he joined the Hercules organization in 1942 and became associated with the Cleveland office in 1946.

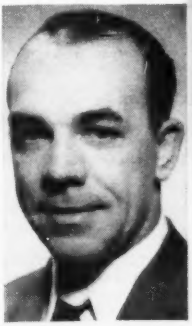
He has been active in the Society of Plastics Engineers, and served as chairman of the 1950 national meeting of the Society held in Cleveland.

Leonard A. Davis

LEONARD A. DAVIS was elected president of the Morrison Engineering Corp., Cleveland, Ohio, at a recent meeting of the board of directors. He succeeds **CARL R. SARE,** who resigned to assume other responsibilities.

Formerly associated with the Lombard Corporation of Youngstown, Ohio, Mr. Davis has had extensive experience in sales and engineering of hydraulic machinery and heating equipment for the light metals industry.

Sun Chemical Corporation has named **JOHN D. CAMPS** as general sales manager of the Overseas Division. Mr. Camps, a graduate of Jesuit University, Barcelona, Spain, and of the University of Barcelona, is well known in the export trade of the Western Hemisphere.



Albert C. Geller

Amercraft Products, Inc., 1024 S. California Ave., Chicago, Ill., manufacturer of buffs, polishing wheels and anode bags, has announced the appointment of **ALBERT C. GELLER** as sales manager.

Mr. Geller has been associated with the manufacture and sale of wheels for polishing, buffing and abrasive purposes for more than 15 years and is widely known in the metal finishing industry in the Middle West. His sales organization, with headquarters in Chicago, will include **JOHN FRENCH** of Rockford, Illinois, **OSCAR F. PATZKE** of Milwaukee, Wisconsin, and **JACK GOORY** of Cleveland, Ohio.

LOUIS F. WEYAND of Detroit, vice president in charge of the Minnesota Mining & Manufacturing Company's adhesives and coatings division, has been elected to the board of directors.

A veteran of 35 years with the company, Mr. Weyand joined 3M in 1915. He subsequently held a number of sales supervisory posts, and was named general manager of the adhesives division in 1945. He was elected a vice president of the firm in 1948.

Norton Co., Worcester, Mass., has announced the appointments of **W. EARLE SHUMWAY** as manager, sales engineering department, Abrasive Division, and **FRED L. CURTIS** as sales manager, Western Region. These appointments became effective April 15.

W. Earle Shumway (left), Fred L. Curtis

Hercules Powder Company has announced the appointment of **LAWRENCE J. FINNAN, JR.** as director of purchases. He succeeds **ANDREW VAN BEEK,** who will rejoin the company's explosives department.

Mr. Finnan joined Hercules in 1915 as a clerk in the purchasing department, and since 1929 has served as assistant director of purchases.

Mr. Van Beek joined Hercules in 1923 following his graduation from the University of Iowa, and served at three company explosive plants. In 1946 he was appointed director of purchases.

Appointment of **L. S. FULTON** as manager of the Glidden Company's West Coast Paint Division, succeeding Z. G. Peck, who has retired after 30 years of service with Glidden, has been announced by A. D. Duncan, vice president in charge of the Paint and Varnish Division.

Mr. Fulton, who is widely known throughout the paint industry, formerly served as director of regional distribution in Glidden's Cleveland headquarters. He joined the company in 1920.

L. S. Fulton

CHARLES W. BLACKETER has been appointed technical director of the Stamford, Connecticut branch of Atlas Powder Company's Industrial Finishes Department, according to an announcement by G. B. Work, general manager. **GUIDO ARIOTTI** succeeds Mr. Blacketer as manager of the Customer Service Department.

Charles W. Blacketer (left), Guido Ariotti

Mr. Blacketer joined the company last year as manager of Customer Service after extensive experience with Berry Bros., Sherwin-Williams, and Diamond Alkali Company. He attended the University of Chicago, and is a member of the Federation of Paint & Varnish Production Clubs, American Chemical Society, and ASTM.

Mr. Ariotti completed 25 years' service with Atlas last year, all spent with the Zapon Industrial Finishes Department. He has specialized in laboratory and field service on all types of product finishes.

E. G. Schroeder

G. J. Berry, vice pesident in charge of sales, The Electric Products Co., Cleveland, Ohio, has announced the appointment of **E. G. SCHROEDER** to the position of sales manager of the company. In his new position, Mr. Schroeder will be responsible to Mr. Berry for all headquarters and field direct sales activities.

A graduate engineer of Rensselaer Polytechnic Institute, Mr. Schroeder was associated with the New York Electric and Gas Corporation and The General Electric Company before joining The Electric Products Company in 1945.

Previously associated with The Electric Products Company as field sales manager, and prior to that position, district manager of the Detroit office, Mr. Schroeder has a broad industrial sales background.

C. Heamon Castle

Donald T. Barrett, president and treasurer, Roto-Finish Co., Kalamazoo, Mich., has announced that the board of directors elected **C. HEAMON CASTLE** to the position of vice president.

The Roto-Finish Company, formerly known as The Sturgis Products Company, moved into its newly constructed plant at 3600 Milham Road in Kalamazoo during the summer of 1949.

HONORS

The Mattiello Lecture Committee has chosen **THEODORE F. BRADLEY,** one of the country's leading authorities in the field of paints, varnishes and plastics, to deliver the Joseph J. Mattiello Memorial Lecture before the Federation of Paint and Varnish Production Clubs at its annual convention this year. His lecture will cover the new developments in the technology of drying oils and varnishes and will deal with new developments involving the chemistry and technology of fatty acids, polyols and esters.

Theodore F. Bradley

Mr. Bradley attended Rensselaer Polytechnic Institute and Rutgers University, and began his career in the protective coating field in the laboratories of the Sherwin-Williams Company in 1920. From 1928 to 1943, he was employed by the American Cyanamid Company as a research group leader. During the war he served in a technical capacity with the Technical Division, Chemical Warfare Service, U. S. Army. Since that time he has been with the Shell Development Co., Emeryville, California.

Mr. Bradley is a member of the American Chemical Society, the Golden Gate Paint and Varnish Production Club, and the Armed Forces Chemical Association.

Outstanding sales records and long-time service of Udylite employees were accorded recognition by officers of The Udylite Corporation during the firm's annual national sales convention in Detroit recently. Ten top salesmen and nine 15-year employees of the company were presented with awards in token of their achievements.

Gold service pins were awarded to the following 15-year employees by L. K. Lindahl, president; **LLOYD WITHINGTON,** head of the cost department; **LETHA**

John Davis, chief engineer, The Udylite Corporation, receives a gold pin from L. K. Lindahl, president, in recognition of his 15 years of service with the company.

FRAME, head of the order dept.; **ANN BELVITCH,** accounting dept.; **ARTHUR BARAK,** assistant treasurer; **JOHN DAVIS,** chief engineer; **EDWARD WHITE, WILLIAM LAIRD, GEORGE MAUWS,** and **HERMAN MARASUS.** The following salesmen, all of whom sold over $500,000 in plating equipment during 1949, were presented wtih handsome plaques by L. V. Nagle, vice president and sales manager; **LAWRENCE STOCKWELL,** Detroit; **DAVID STOCKTON,** Chicago; **LOUIS MINBIOLE,** Detroit; **WILLIAM MOYER,** Philadelphia; **VINCE KELLY,** Indiana representative; **JOSEPH HOEFER,** Detroit; **JAMES CLIFFORD,** New York; **HARVEY ZENS,** Detroit; **JAMES FITZGERALD,** Detroit, and **ED STACK,** Chicago.

MEETINGS

The **37TH ANNUAL CONVENTION** of the **AMERICAN ELECTROPLATERS' SOCIETY** and **4TH INTERNATIONAL CONFERENCE ON ELECTRODEPOSITION** will be held in the Statler Hotel, Boston, Mass., June 12-15, 1950.

In addition to a technical program of outstanding interest and value, members and guests who attend the Convention will have an opportunity to view a wide variety of historical and cultural sites. Boston is also a center of industry and commerce containing approximately 5200 manufacturing plants in its metropolitan area. In addition to well known companies which have extensive and modern plating departments, a large number of job plating shops serve industry in the Boston area.

NECROLOGY

The death of **L. D. HOLLAND,** assistant to the president and a member of the Board of Directors of E. F. Houghton & Co., Philadelphia, occurred on April 14 after a long illness. He was 46, and had been connected with Houghton since 1927.

The abrasive industry has lost a great leader by the death on March 23, 1950, of **FRANCIS E. GALLAGHER,** chairman of the board of directors of Behr-Manning Corporation. During his many years' association with the coated abrasive industry he made countless contributions important in the development of coated abrasives and allied products.

He was vice-president and general manager of Behr-Manning previous to becoming president in 1938 and served as president until retirement from active service in January, 1950, when he was named chairman of the board.

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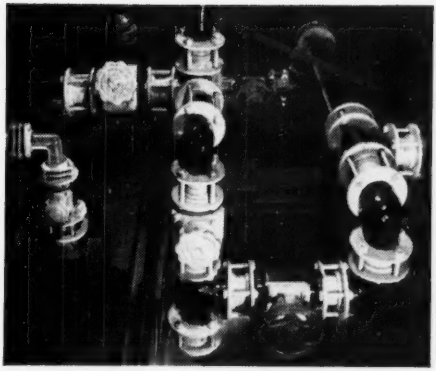

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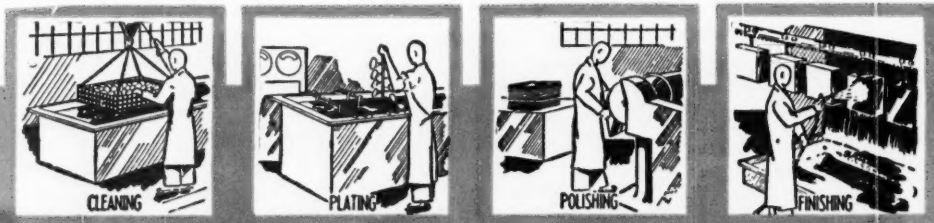


New • EQUIPMENT • MATERIALS • PROCESSES

Hydro-Filter Spray Booth and Paint Sludge Disposal Unit

In an endeavor to reduce cleaning and maintenance requirements of spray booths to a minimum, and to eliminate the necessity for periodic interruptions in production to permit removal of paint sludge from the surface of the solution in the charging tank, The R. C. Mahon Co., Detroit 11, Mich., has developed the Hydro-Filter Spray Booth and Automatic Sludge Segregator and Unloader.

Air is exhausted from the spray booth through the vertical fluted "Hydraire" flood sheet consisting of a staggered front and rear section, which permits passage of air through the flutes and creates an even suction over its entire flooded area. This eliminates eddies, and produces an even flow of air throughout the working area of the spray booth. Front and back sections of this flood sheet are so designed, coordinated, and flooded as to produce eddying traps which remove the bulk of the overspray at this point. The remainder of the overspray is struck from the air by torrents of chemically treated water in the rear of the flood sheet. Water eliminators, similar in design to the Hydraire flood sheet, form the rear wall of the washing chamber and effectively remove the entrained water from the air, the manufacturer states.

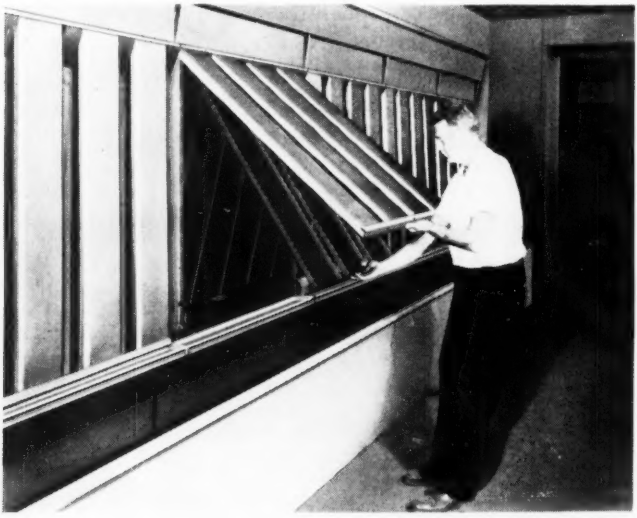


Fig. 1—The Mahon "Hydraire" Flood Sheet and the Eliminators in rear of the washing chamber of the Hydro-Filter unit are removable in sections from the front. This facilitates inspection and cleaning if necessary.

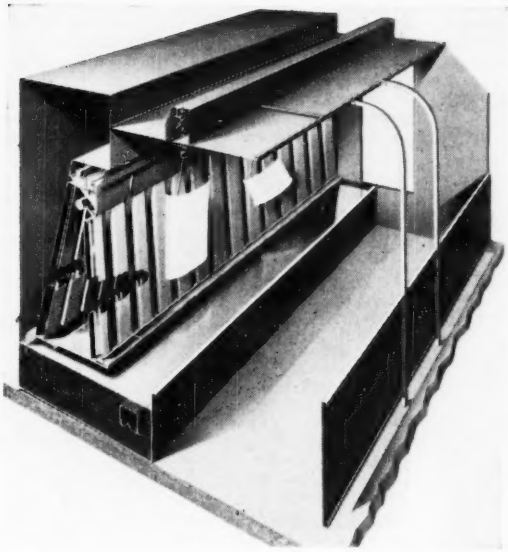


Fig. 2—Sectional view showing the working principle of the Mahon Hydro-Filter Spray Booth, which is also available in the "Downdraft" type for use with floor conveyor systems.

In the spray booth, twice the amount of water is circulated at one-half the static pressure required in former models and the washing area has been increased four and one-half times, thus reducing cleaning and maintenance problems.

According to the manufacturer, sludge disposal problems have also been solved in the spray booth. Particles of paint forming into a sludge on the surface of charging tank move constantly, due to an induced water current, toward and over a weir into a jet eductor chamber where the sludge is picked up as fast as it accumulates and conveyed hydraulically to the Automatic Sludge Segregator and Unloader.

The Automatic Sludge Segregator and Unloader may be located in any convenient place in relation to the spray booth. It traps the paint sludge removed from the chemically treated water and returns the water to the charging tank of the booth; this circulation is continuous while the spray booth is in operation. The unloading device, which functions automatically, dumps the accumulated paint sludge through a hopper into any portable receptacle for reclamation or disposal.

The Mahon Spray Booth can also be furnished in the "Downdraft" type, for floor conveyor systems, with Hydro-Filter Units below the floor level of the booth. Both types can be engineered to accommodate any product regardless of size or shape.

Magimmick Magnetic Sweeper

A magnetic sweeper that will pick up stray nuts, bolts, screws and small metal parts has been introduced as Magimmick

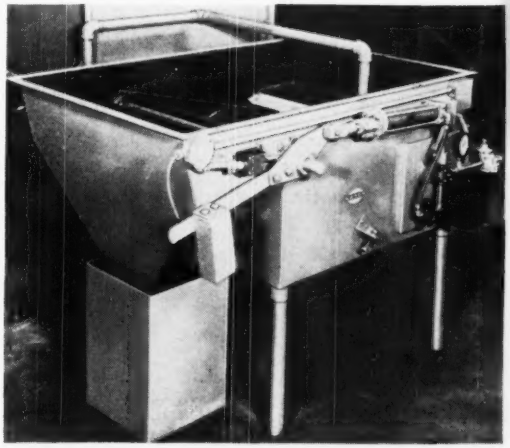


Fig. 3—The Mahon Automatic Sludge Segregator and Unloader automatically removes the paint sludge from the surface of the spray booth charging tank as fast as it accumulates, thus saving production time and maintenance man-hours.

Magnetic Sweeper by Ullman Products Corp., 152 PF Prospect Ave., Brooklyn 15, New York.

Magimmick Magnetic Sweeper

The Magimmick Sweeper has a 12-inch powerfully magnetized surface, and rolls easily over floors on fiber wheels, picking up small steel parts. Compactly designed, it reaches into corners, under benches and machines. The patented release enables sweepings to be released by merely opening the cover. This breaks the magnetic adhesion and articles drop off instantly.

Pur-O-Carb

The Hanson-Van Winkle-Munning Co., Matawan, N. J., is now offering an activated carbon called Pur-O-Carb. This material is said to be excellent for purifying bright nickel solutions of all types, including the H-VW-M 9H solutions, and also for all other acid and alkaline plating solutions.

According to the manufacturer, every production batch of Pur-O-Carb is tested in the laboratory for effectiveness. Upon approval, a label is placed on each container which goes into warehouses or direct to the consumer, thus assuring the user of a checked and tested carbon, approved for use in electroplating.

V-200 Series Corrosion Resistant Coating

Specialty Coatings Laboratory, 1721 North Water St., Milwaukee 2, Wis., has developed a series of plastic-base coatings to solve specific corrosion proofing problems. The first of the coatings, known as the V-200 series, is recommended for use wherever a simplified coating system is required to protect chemical or processing equipment from strong corrosive fumes.

The V-200 coatings are available in clear or colors and may be applied by spray, brush, or dip, to be quickly air dried or baked, and yield a flexible, abrasion resistant coating highly adherent even to polished metal surfaces. The coating has a coverage of approximately 250 sq. ft. per gallon per mil thickness.

The corrosion inhibitive pigments compounded into the chemically inert resin system produce long-time protection when subjected to corrosive salt atmospheres, alcohols, soaps, fruit juices, acids, alkali, petroleum products, or related corrosives, the manufacturer states.

G-S Safety Hood

The G-S Safety Hood, product of the General Scientific Equipment Co., 2731 W. Huntingdon St., Philadelphia 32, Pa., is fitted with a large plastic window for easy visibility and protects the worker's face, head and neck from dangerous sprays or splashing while working on acid storage tanks or pipe lines, degreasing, pickling, enameling, paint spraying, sandblasting and similar operations. It may be worn with goggles or respirator. A supporting frame in the hood greatly increases comfort and effectiveness.

Coated with a recently improved rubber, the fabric in the hood is claimed to be impervious to moisture, most acids,

G-S Safety Hood

caustics, oils, and solvents, and protects against extreme temperature and light metal splashes. In addition, flexibility is retained for long, durable life.

Blacking Process

The A. F. Holden Company of New Haven, Connecticut and Detroit, Michigan, has announced the manufacture of a process designed for blacking stainless steels, cast iron, malleable iron, as well as S.A.E. or any other steels.

The process may be used in equipment already installed, and the only variance in the process is the use of a new chemical cleaner which prepares the metal surface to obtain a uniform black, the manufacturer states.

Black Litho Finish

The Watson-Standard Co., 225 Galveston Ave., Pittsburgh 30, Pa., has announced an improved black litho for the metal decorating industry. Known as 10-197A, it is said to possess unusual depth and intensity. Objectionable undertones common in most blacks have been eliminated, it is claimed. When fabricated into a closure or cap, the intensity of the blackness may be compared to that of a plastic molded closure.

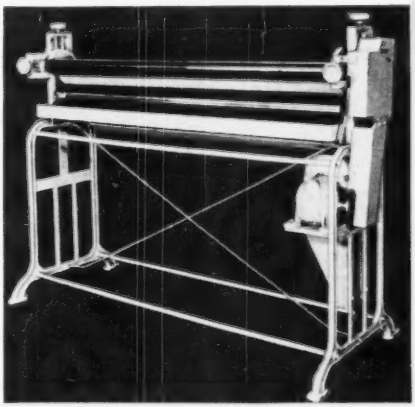
10-197A Black Litho Finish is primarily formulated for roller-coating. A film weight of 19 to 22 mg./4 sq. in. produces a mirror-like surface of jet blackness. According to the manufacturer, the excellent fabrication and tumbling qualities make it especially suitable for use in making caps and closures.

Strong Speed Coater

A roller coating machine said to feature unusual versatility and simplicity has been announced by L. R. Wallace & Co., 440 Seaton St., Los Angeles 13, Calif. Known as the Strong Speed Coater, it will coat any flat surface with oil, lacquer, enamel or adhesive. The thickness of the coating can be precisely controlled by a simple adjustment, making possible coverage of up to 850 sq. ft./gal. of coating materials.

The Strong Speed Coater handles flat materials of any length and up to 50 inches in width and 1½ inches in thickness. It operates at 4020 linear ft./hr., which is equivalent to 16,880 sq. ft./hr. when material is 48 inches wide.

Coating materials with a wide range of consistencies, from very light oils to heavy adhesives, are handled with equal facility by the new coater. Its four-inch Neoprene rolls, designed for long life, are impervious to virtually any coating materials which may be used. Special drip-



Strong Speed Coater

proof end plates confine coating material in reservoirs, assuring economy and cleanliness, the manufacturer states.

Special models are available for coating two sides of material in one operation, as well as models to handle material in widths greater than 50 inches.

Automatic Spray Decorating Machine

A machine for automatic spray decorating a variety of small plastic and metal parts, on a mass production basis, has been designed and built by Conforming Matrix Corp., 356 Factories Bldg., Toledo 2, Ohio.

By use of different electroformed masks, which are readily interchangeable in the machine, and a resetting of the gun angles, many varied parts can be spray painted at speeds of from 700 to 3600 pieces per hour. Most parts can be handled at a rate of 1500 or more pieces per hour.

Entirely air operated, the machine eliminates the hazard of electric motors and mercury of solenoid switches, as well as the need for explosion-proof electrical equipment.

Masks for a particular part and color are so inserted as to be flush with the top of the working table of the machine. Spray painting is from below, and against the masks, not from the top. Masks, accordingly, do not have to be cleaned so often. Surplus spray falls away, is sucked off and exhausted from the back of the machine.

The operator holds the parts from above exerting only the necessary manual pressure for proper sealing of pieces against the masks. Two-color parts can be painted, one color right after another depending upon the nature of the job.

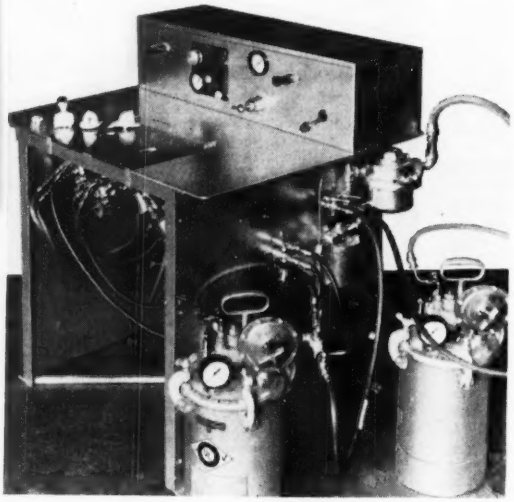
The use of a conveyor belt, bringing the work to the operator and also taking it away, permits him to use both hands for loading, thus doubling his productivity.

One hand dial regulates the amount of paint sprayed. This extreme flexibility is important to those who produce a variety of work on pieces having varying requirements and paint coverage.

Once the machine is set, the same amount of paint is always sprayed on every part regardless of the speed of loading cycle, thus effecting a paint saving of up to 50 per cent over hand spraying.

The machine is compact, measuring 48 inches wide by 36 inches deep, and has a table height of 30 inches. It employs eight of the newest automatic spray guns, and two 2-gallon air-agitated paint pressure tanks with four insert containers. All working parts are automatically oiled. Air regulator for the guns, filter, and automatic moisture trap is standard equipment. A second air regulator controlling the machine mechanism, as distinguished from the atomized air for the guns, is also provided. All controls except the "start" and "stop" push buttons are mounted in the control panel.

All that is required is an air supply which will maintain 80 pounds minimum pressure, and the necessary electroformed masks. Conveyor belts which move across the top of the machine in synchronization with the loading cycle are also available.



Automatic Spray Decorating Machine

Improved Merlon Plating Barrel Clamp

An improved plating barrel clamp of Merlon construction designated as Type "C" has been announced by the Hanson-Van Winkle-Munning Co., Matawan, New Jersey.

Improved Merlon Plating Barrel Clamp

Constructed of two parts, the clamp is of molded construction for all 14-inch cylinders; for other sizes, clamps will be cut to order. It is simple to operate, having an adjustable screw for contraction or expansion. There are no metal parts, thus eliminating places where a metal deposit might form.

Polyken No. 163 Electrical Tape

Polyken No. 163 Electrical Tape, announced by Polyken Industrial Tape, 222 W. Adams St., Chicago 6, Ill., can be purchased in either 60 or 82½-foot rolls, ¾ inch in width, in bulk, individual cartons or a 10-roll Job Pack, which contains 600 feet of tape.

The manufacturer states that Polyken No. 163 exceeds ASTM Friction Tape specifications eight ways: higher dielectric strength, better moisture barrier, less bulk with equal strength, sticks quicker, stays cleaner, unwinds easily, doesn't fray, and sticks firmly to any clean surface. Because Polyken No. 163 is manufactured by a calendering process and is not a friction tape, its clean black cloth backing is non-sticky, will not collect grime from exposure or handling.

End-O-Rust

End-O-Rust, a corrosion and oxidation resistant coating, for use on metals, has been marketed by End-O-Rust, Inc., 1900 Euclid Ave., Cleveland, Ohio. It has a high, hard gloss finish, and is claimed to be impervious to erosion, weathering and hard wear. It is especially recommended for coastal areas to withstand dampness, humidity or salt air.

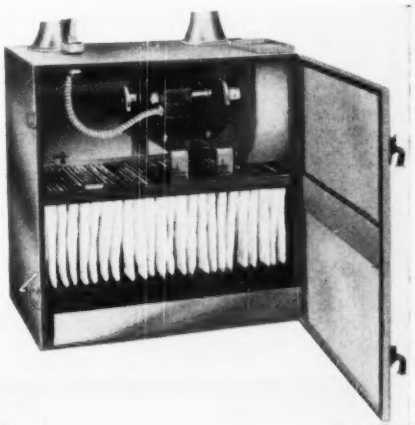
With End-O-Rust complete protection is achieved without dip and heat treating methods; no special preparation of surfaces is required.

It will air dry for handling in 2 or 3 hours, force dry within 30 minutes, and infra-red bake in 3 to 5 minutes.

Dust Collector

Available in ½, ¾, 1½, or 3 h.p. with velocities of 5400, 5400, 5300, and 6000 f.p.m., respectively, a Dust Collector has been announced by The Hisey-Wolf Machine Co., Division of The Cincinnati Electrical Tool Co., Cincinnati 8, Ohio.

Air filtered through the Dust Collector is exhausted inside the building, no outside pipes being required. The dust and grit-laden air is thoroughly filtered through closely-woven fabric and steel wool filter bags. Heavy particles are directed downward by a baffle plate directly into a large tray. A convenient foot lever shakes and cleans the bags into the tray, which is readily removable.



Dust Collector

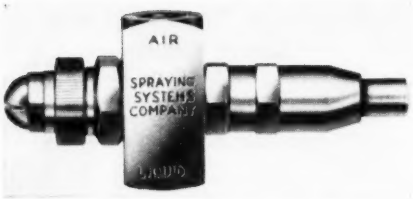
Polyethylene-Lined Drums

To facilitate use of acid-resistant polyethylene coatings sprayed by the Schori Flame Spray Pistol, Schori Process Division, Ferro-Co Corp., 8-11 Forty-Third Rd., Long Island City 1, N. Y., is offering polyethylene-lined 30- and 50-gallon Hackney open head seamless barrels. The drums are available lined with polyethylene $\frac{1}{32}$-inch thick; $\frac{1}{16}$-inch linings are also available for use where the linings are subject to mechanical abuse.

The polyethylene-lined drums eliminate the high damage potential of crocks and glass vessels to personnel and equipment. The manufacturer states that they are returnable and may be used over and over indefinitely.

Pneumatic Atomizing Nozzle with Clean-Out Needle

Claimed to reduce maintenance and down time costs, the ¼ J Pneumatic Atomizing Nozzle with Clean-Out Needle has been marketed by Spraying Systems Co., 3201 Randolph St., Bellwood, Ill. The



Pneumatic Atomizing Nozzle with Clean-Out Needle

clean-out needle is a part of the assembly, and by pushing the plunger end at the rear of the nozzle, the entire orifice passage is cleaned.

Normal position of the clean-out needle is open under spring loading; and it will return to this open position whenever the plunger is released. Nozzle and clean-out assembly is available in a variety of materials such as brass, stainless steel, or Monel metal. Nozzle assemblies can be supplied in all standard Spraying Systems pneumatic atomizing nozzle setups for internal or external mixing of air and liquid to produce round, multiple round, or flat sprays.

Kalamazoo **TUMBLING BARRELS**

★ Made to your specifications—any shape or size.

★ Choice of fir, oak, cypress, or redwood construction.

★ Last longer, cost less.

★ Suggestions, estimates without obligation.

Kalamazoo TANK AND SILO COMPANY

528 HARRISON ST. • KALAMAZOO, MICH.

M-S-A Portable "Samplair"

Accurate, on-the-spot analyses of atmospheric concentration of chromic acid mist in the automotive, electrical appliance, and household utensil industries, and commercial chromium plating establishments, are possible with the M-S-A Portable Samplair. Manufactured by the Mine Safety Appliances Co., Braddock, Thomas and Meade Sts., Pittsburgh 8, Pa., the Samplair is also recommended for checking poor ventilation, defective piping, and faulty processing systems. It is hand-operated, and can be used where power is unobtainable, or where electrically powered drives would constitute a fire or explosion hazard.

Basically a specially constructed hand pump, the Samplair is simple to use. It draws 600 ml./stroke of the pump handle, and determininations are made by comparing the filter paper discs used for the tests with established color standards. The filters will indicate concentrations from 0.5 mg./10 to 4.0 mg./10 cubic meters.

Improved Method for Precise Gaging of Dry Films and Foils

Maynard R. Euverard, of Interchemical Corp., New York City, has reported the development of a highly accurate method, employing the Interchemical Direct Reading Thickness Gage, for measuring attached dry films and thin sheet metals, foils, paper or plastic.

Fig. 1—Observer measuring attached dry film thickness visually with Interchemical Direct Reading Thickness Gage and optical attachments.

Attached dry films are measured visually by means of an optical attachment

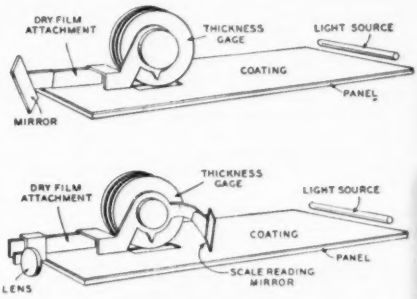


Fig. 2 — Upper sketch shows Interchemical Thickness Gage as used with mirror for observing light gap between measuring surface and coating, and graduations on the Gage from above. Lower sketch shows optical lens used in the Thickness Gage which allows observer to see the light gap and read the graduation scale without changing position of view.

to the gage plus a suitable light source. The film is stripped at two points about ½ inch apart and the two outside gage wheels rest on these stripped areas. Then the gage is rotated until its eccentric center wheel touches the film. A light source (placed behind the gage) permits observer to check the point at which center wheel meets the film and cuts off light. Direction of gage rotation can be reversed and the average of two readings used for greater accuracy. Measurements are reproducible with sharp end points.

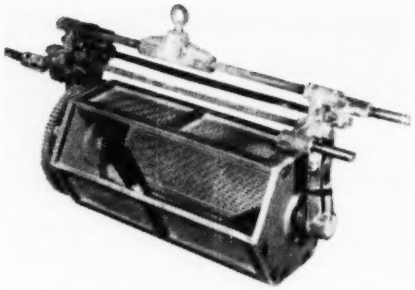
For measuring thin metal sheets, foils, paper and plastic film, a feeler method is used. The Interchemical Gage rests on a plane surface with its eccentric center wheel at maximum reading. A narrow strip of the sheet material is placed on the plane surface between the two outer wheels. Then the gage is rotated over the strip until a slight binding is noticed as the strip is slid under the measuring surface. A reading at that point gives the thickness. A second reading with the gage rotated in reverse direction can be averaged with the first as in attached dry film measurements.

Interchemical Direct Reading Thickness Gages and attachments for dry film measurement are marketed by Henry A. Gardner Laboratory, Inc., 4723 Elm St., Bethesda, Maryland.

Vinrex

Vinrex, a product of Rexton Finishes, Incorporated, 62 Woolsey St., Irvington 11, N. J., is a line of scientifically formulated specialty coatings that stick exceptionally well to highly polished chrome, brass, aluminum and even zinc plate.

According to the manufacturer, chrome plated pieces finished with one coat of Vinrex White have withstood over 1,000 hours' water immersion with no loss of adhesion or gloss, or any sign of blistering after this abuse. It is available in clear, black, white, and some colors.



Merlon Ribless Barrel Plating Cylinder

Merlon Ribless Barrel Plating Cylinder

The Hanson-Van Winkle-Munning Co., Matawan, N. J., has developed a Mercil Type Merlon Ribless Cylinder, in 14 x 30-inch size, for use with all commonly employed plating solutions.

The ribless cylinder is hexagonal in shape, the body being made up of five covers. It has no ribs, tie rods or tie rod tubing. Merlon sheet stock is utilized for the covers with a dovetailed slot milled along the edge of each cover. The joining is made by a dovetailed piece of Merlon driven into each slot.

The cylinder employs flexible dangler, hair pin dangler or disc-type contacts. Where flexible dangler contacts are used, the heads are furnished with Merlon bushings, and Merlon trunions are used in the hangers. With hair pin dangler or disc contacts, steel trunions with standard flanged type covers are supplied.

Outstanding advantages include 15 per cent greater capacity for work and reduced maintenance. Also, where the flexible dangler contact is used there is no chance of build-up of deposit on parts of the unit since the only place in the cylinder where current is available is at the end of the flexible dangler contact.

FASTER, BETTER FINISHING
with
HARRISON'S
NEW
4A
BUFFING *and* POLISHING COMPOUNDS

You send us a sample of metal used. We will return finished sample together with compound for your specific requirements.

Speed up production with correct compositions.

HARRISON & COMPANY, INC.
Haverhill, Massachusetts

Simplified Water Hardness Determination

Total water hardness and the hardness caused by calcium alone now are accurately measured by simple, easy methods in approximately one minute, according to an announcement by Hall Laboratories, Inc., 1943 Hagan Bldg., Pittsburgh, Pennsylvania.

The Hagan Total Hardness Test, as it is designated, involves a simple, direct titration with a distinct color change at the end point, so that the possibility of error due to subjective judgement is eliminated. Also of practical advantage in its application is the fact that interferences, if found, are easily eliminated.

The Hagen Calcium Test is, similarly, a direct titration to a clear-cut color change. No complicated heating, waiting, filtering or estimating is required. The answer, correct to less than 1 p.p.m. of

calcium, is determined in one minute.

Where it is desirable to determine hardness due specifically to magnesium in the water, the operator makes the total hardness test and the calcium test, the difference giving him the magnesium value.

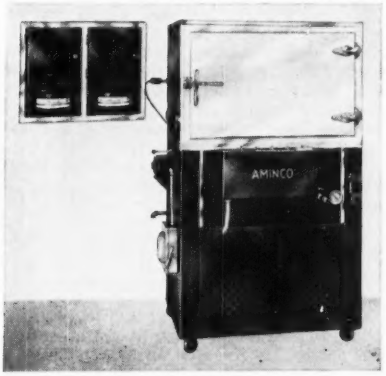
A clear sample of the water to be tested for total hardness is measured into a porcelain dish, and a small amount of buffer solution is stirred in to bring the sample to a suitable pH value. The indicating solution then is added, and stirred. The sample at this point shows a red color. The final step is addition of the titrating solution, which turns the color to blue. Disappearance of the last trace of reddish tinge marks the end point.

Procedure for hardness due to calcium alone is identical, but with a different buffer solution and indicator, and with final color after titration a violet blue.

All equipment and reagents required for either the total hardness test or the calcium test are available through Hagan Corporation (parent of Hall Laboratories, Inc.) and its associated firms, Calgon, Inc., and The Buromin Company.

Humidity-Temperature Test Apparatus with Program Control

Precisely controlled variations of humidity and temperature can be repeated



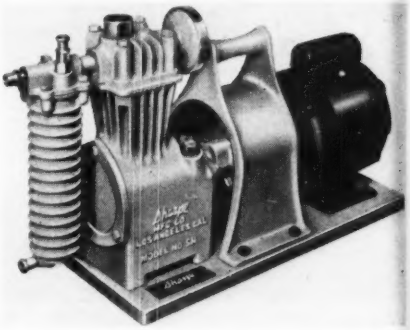
Humidity-Temperature Test Apparatus with Program Control

periodically, according to a predetermined program, by means of an apparatus announced by the American Instrument Co., Inc., Silver Spring, Maryland. The unit consists of a test chamber, an air conditioning unit, and a special control system.

Standard apparatus provides three humidity-temperature program schedules of interest to government laboratories and manufacturers supplying equipment to the government. Apparatus for other program schedules is available.

Sharpe 5N Compressor

An ideal compressor for use with a cup gun or material container, which is said to provide rapid production and depend-



Sharpe 5N Compressor

able service, has been developed by the Sharpe Manufacturing Co., 1224 Wall St., Los Angeles 15, California.

Designated as the Sharpe 5N Compressor, the unit is light and compact yet sufficiently rugged to furnish dependable performance.

Advantageous features outlined by the manufacturer include a closely honed cylinder in which a lightweight auto-type piston is mounted; accurate machining to close tolerances for high efficiency; counter-balanced crankshaft mounted in double suspension with ball bearings; and large intake filter and air conditioner. The unit is powered with a ½ h.p. motor and rated at 5.31 cubic feet displacement and 50 p.s.i. working pressure.

Sly Bench Blast Cabinet

Designed for the abrasive blast cleaning of small parts, such as dies, tools, castings and so on, a portable bench blast

cabinet has been developed by The W. W. Sly Manufacturing Co., 4700 Train Ave., Cleveland 2, Ohio. Requiring a space of only 14 x 18 inches the unit will operate on the compressed air supplied by a stand-

Sly Bench Blast Cabinet in use

ard 5 h.p., two-stage compressor.

The operator loads the parts through the top hinged cover and observes the work through the window in the cover. Operator's hands in rubber gloves rotate the work in the blast stream. A ventilating fan draws off the dust which is retained in a removable filter bag. Efficient vision during blasting is provided by a side-mounted light.

Base Y 2054 Synthetic Protective Coating

A fast drying enamel that is said to reduce finishing time by 40 per cent and cut storage and handling requirements by 50 per cent has been introduced by the United Lacquer Mfg. Corp., 1001 W. Elizabeth Ave., Linden, N. J. Known as Base Y 2054, the synthetic protective coating provides the hardness of a baked-on synthetic, but air dries as fast as lacquer in just a few minutes.

Base Y 2054 was designed particularly for plants which do not have baking facilities. By providing hard, highly resistant top surface quickly, the finish speeds up the manufacturing process for these plants and eliminates the need for a 24-hour air drying period. Products finished with the synthetic may be handled and stacked within 15 minutes and packed in three to four hours, the manufacturer states.

The synthetic offers a higher build, a better gloss where desired, tougher film, and high resistance to alkalies, fats, grease and smoke, it is claimed. It may be polished to a hard gloss and has outstanding gloss and color retention, even under high humidity conditions.

Antique Gold Plating Solution

Production of many beautiful antique effects from a single plating solution has been made possible as the result of the development of "one operation" antique gold plating solutions by Davis-K-Products Co., Dept. PF, 54 W. 22nd St., New York 10, New York.

According to the manufacturer, previous procedures entailing a number of preliminary steps are no longer required. For example, through the use of the new solution, it is no longer necessary to smut the work, relieve, and then gold plate.

The new procedure specifies a 10 to 15-second plate in the new gold plating solution, followed by a few minutes' ball burnishing. Savings claimed for the new procedure include the time previously used in wiring and unwiring operations. In addition, it is claimed that more uniform finishes are produced and possibilities for error due to lack of proper technique by operators have been reduced considerably.

Samples forwarded to the company at the above address will be finished by the new process free of charge during the period of this introductory offer.

Model S-186 Microscope

A wide field industrial 20-power microscope, Model S-186, with stand is now being produced by the Buhl Optical Co., Dept. TP-11, Pittsburgh 12, Pa. A rugged shop microscope designed to withstand the rough handling of shop use, it is particularly valuable where work requires close and accurate checking of details, such as castings, machined threads, surface finishes, welds, textiles, raw materials, fibers.

Industrial Unit Spray-Washer

The self-contained Spray-Washer, being offered by the Industrial Filter & Pump Manufacturing Co., 1625 W. Carroll Ave., Chicago 12, Ill., was developed for washing such intricate assemblies as typewriters, teletype machines, and similar equipment. A thorough cleaning is accomplished in a very short time without disassembling these machines; in manufacturing, baskets of small parts can be handled as units.

The washer is substantially built, consisting essentially of a welded steel tank, 20 x 24 x 24 inches, with a perforated steel false bottom for supporting the work to be cleaned. In each corner are four swivel spray nozzles that direct fine, forceful sprays on the parts. An ample supply of the solvent is carried in the sump below the false bottom.

The tank is supported on a sturdy frame of angle iron and steel base which carries the pumping unit for circulating and solvent. The motor and switch are of the explosion-proof type to permit the use of low flash-point cleaning solvents. Four 3-inch casters provide for easy mobility.

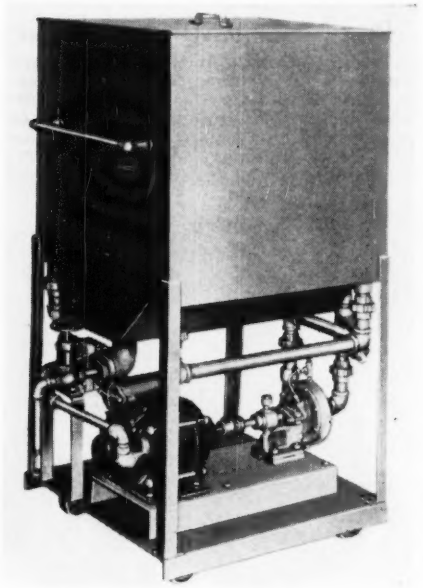


Fig. 1—Industrial Unit Spray-Washer complete with pump, explosion-proof motor and switch, and piping.

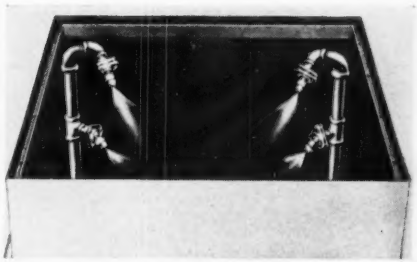


Fig. 2—Unit Spray-Washer with cover removed, showing washing action of the solvent sprays.

The unit is finished inside and out with a solvent-resistant paint. The overall height is 49½ inches.

Gold Lacquers

The Watson-Standard Co., 225 Galveston Avenue, Pittsburgh 30, Pa., has announced the development of a series of gold lacquers for the metal decorating industry. The lacquers are designed for can coatings, cap and closure coatings, crown coatings and other specialized uses. They are applicable where fabrication process, sterilizing, chemical resistance, adhesion and water resistance are required, the manufacturer states.

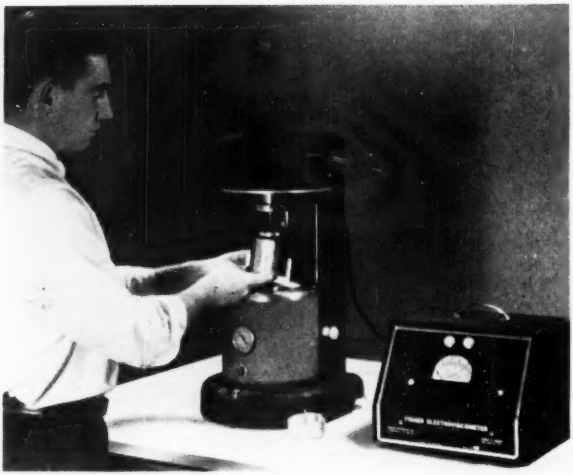
The series of gold lacquers includes a wide variety of types depending on the end use. The lacquers are primarily based on oleo-resinous resins, alkyd resins, vinyl resins and other special gold lacquer vehicles.

A table of applications and uses of these gold lacquers has been prepared for the metal decorating industry.

Fisher Electroviscometer

Viscosity measurements directly in centipoise units and without the need for calculations are now provided by the use of the Fisher Electroviscometer, product of the Fisher Scientific Co., 717 Forbes St., Pittsburgh 19, Pa. The instrument provides highly reproducible results, has unusual sensitivity over its full range, and is simple to operate.

The instrument comprises a stand on which the sample is held in a cup and revolved at constant speed around a "bobbin". The central element is movable and can be turned in opposition to



Fisher Electroviscometer in use

the natural pull of the liquid under study as shearing force is exerted against the bobbin. A magnetic field, to which variable amounts of electrical force can be applied, is created around the bobbin, adjustable by control knobs on the separate power supply and meter unit. When the magnetic force applied to the bobbin exactly counterbalances the mechanical force exerted by the rotating liquid, the viscosity is expressed in centipoise units read directly from the scale of the instrument.

Features include the choice of two sizes of bobbins, one for liquids of low viscosity (0-500 centipoises), and one for heavier liquids of 500 to 5,000 centipoises. The stand incorporates a constant temperature bath which is readily placed and removed; also a ventilating fan to cool the magnetic coil above the bobbin. The 110-volt a.c. power supply is regulated to ensure constant speed of the sample cup rotation and force applied to the bobbin.

Durvin Gray A. D. Non-Skid Coating SV-363

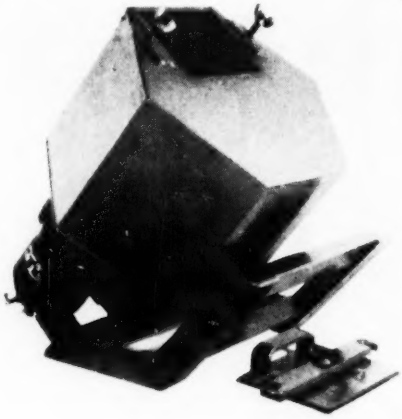
Maas & Waldstein Co., manufacturer of lacquers and synthetic enamels, Newark 4, New Jersey, Chicago and Los Angeles, has developed a special coating that is being used as a non-skid floor coating for application on floors of walk-in deep freeze units, walk-in refrigerators, and is also being used on floors of hotel kitchens, pullman-car kitchens, and hospital operating and delivery rooms.

The non-skid floor coating is known as Durvin Gray A.D. Non-Skid Coating SV-363.

Once applied to metal, wood, or tile floors, Durvin Non-Skid Coating SV-363 is said to provide a safe, skid-resistant covering wherever it is used. This coating material is not affected by fruit juices, butter, milk, and so on, and may be cleaned by brushing or washing, it is claimed.

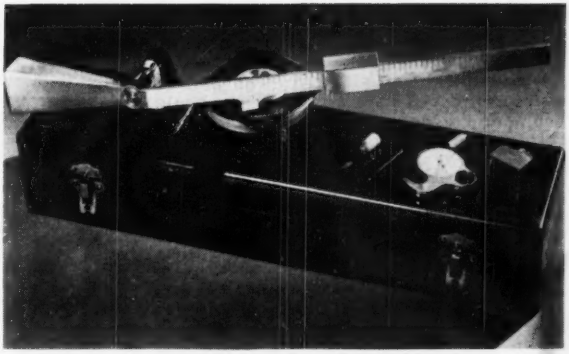
Portable Bench Type Tumbler

Designed to bulk finish small parts conveniently and economically and especially valuable for experimental work, a portable bench type tumbler has been developed by the American Plating Rack Co., 232 N. Rosemary, Inkster, Mich. The tumbler may also be used to tumble



Portable Bench Type Tumbler

Shear Hardness and Diamond Scratch Tester.

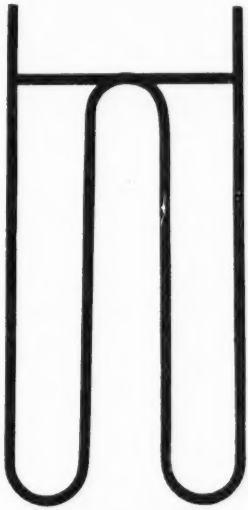


individual pieces too large or heavy to process in a larger barrel.

According to the manufacturer, features of the machine include a novel tilting arrangement for loading and running, adjustable speed, and air-cooled motor and speed reducer. The unit is designed to process 75 lb. of self-tumbling work per load.

Weldless Anodizing Rack

An anodizing rack to be used for supporting aluminum parts during anodizing operations, fabricated without welding,



Weldless Anodizing Rack

has been developed by the F. H. Langsenkamp Co., Dept. PF, 229 E. South St., Indianapolis 25, Indiana.

The manufacturer points out that welded anodizing racks are subject to more rapid deterioration because of erosion and breakage at the welds. The weldless anodizing rack can be used until it is completely deteriorated or at least to such an extent that proper mechanical support of the articles being anodized can no longer be sustained, the manufacturer states.

Shear Hardness and Diamond Scratch Tester

The Model 139 Taber Shear Hardness and Diamond Scratch Tester is a precision tool for testing the quality of plastic materials and plastic coated surfaces to resist scratches, digs, and similar physical damage not classed as normal wear. Product of the Taber Instrument Corp., 115 Goundry St., North Tonawanda, N. Y., it accurately measures the surface toughness and scratch resistance of a plastic or coated surface.

Both tests are performed with a finely balanced scale beam, calibrated in grams, to which is attached the Taber S-20 or S-30 Precision Ground Contour Shear Tool or the 139-55 Diamond Point Scratch Tool. The graduations on the scale beam are wide and legible and represent 10 grams per graduation. A sliding weight provides an adjustment in load from 0 to 500 grams. An extra calibrated weight is also furnished for attachment to the end of the scale beam to increase its load capacity to a total of 1,000 grams.

The scale beam is pivoted on precision ball bearings, and its internal bore is a slide fit over the shaft projecting from the mounting. The gage block to which this shaft is fastened can be raised or lowered to correspond with the specimen thickness, thus maintaining the scale beam in level position whether the specimen is a thin plate or ¼ inch thick.

To operate the Shear Hardness and

Diamond Scratch Tester, the tool selected is inserted in the scale beam which is then positioned on the mounting shaft so the tool rests against a clear area of the specimen to be tested. The sliding weight is moved part way along the scale beam and a cut or scratch is made by turning the specimen by hand slowly and steadily in a counterclockwise direction. The results are then calculated in accordance with instructions furnished with each instrument. The same specimen and specimen mounting table which is used on the Taber Abraser for measuring wear or resistance to abrasion can also be used, if desired, on the Shear Hardness and Diamond Scratch Tester. This eliminates the necessity of preparing additional specimens for the Shear Hardness and Diamond Scratch test only.

Provided with the instrument is a walnut finished instrument case which holds the scale beam, weights, dial micrometer, tools and other parts.

Drip-Proof, 3-Gallon Pail For Acids And Alkalies

Said to be practically indestructible, an Ace-Hide three-gallon chemical pail, said to add greater safety to the handling of virtually any type of corrosive solution, has been announced by American Hard Rubber Co., 11 Mercer Sreet, New York 13, N. Y. The pail is made from a new, tough, resilient, high-styrene, copolymer rubber that provides an excellent combination of light weight, corrosion resistance and strength, it is claimed.

According to the manufacturer, the pail will not chip or crack; because chemicals cannot penetrate the impervious surface, the pail is easy to clean.

A feature of the new pail is its carefully-designed pouring spout which virtually eliminates costly, dangerous drip and keeps the corrosive chemicals from running down the sides of the pail. It pours an easily directed stream, making it possible to pour directly into narrow-necked vessels.

Ace-Hide 3-gallon Chemical Pail

Another feature is its rim design, permitting use of a close-fitting, splash-proof cover. Both rim and bottom of pail are specially reinforced for extra strength. The handle (made of Riji-Tuf, another high-styrene, co-polymer rubber) is shaped to fit the hand. An easy-to-read scale on the inside of the pail is marked off in half-gallons.

Typical corrosives that can be handled safely are: fluosilicic acid, hydrochloric acid, hydrofluoric acid (50 per cent), nitric acid (1.24, at room temperature), phosphoric acid, sulphuric acid (50 per cent), acetic acid, lactic acid, tannic acid, ammonium hydroxide, potassium hydroxide, sodium hydroxide, alum solutions, copper salts, ferric salts, ferrous salts, sodium bi-sulfite, sodium sulfate, stannic chloride, plating solutions (except those containing chromic acid), sodium hypochlorite (25 per cent).

PAINT MIXER

MIRACLE
5 GALLON
PAINT REJUVENATOR
All paint restored to original consistency without opening the can.
2 minutes per gallon.
MIRACLE PAINT REJUVENATOR CO.
128 E. 10th St., St. Paul 1

Auralloy Process

Auralloy Process, which makes possible the electrodeposition of long wearing hard gold alloys of the various popular shades of gold, has been developed by the Platers Research Corp., 59 E. 49th St., New York 3, New York.

For flash deposits Auralloy may be used without a pre-plate to obtain the various Hamilton, pink, and green colors. It is especially recommended for heavy

deposits, which are unusually hard, ductile, and adherent to the base metal. According to the manufacturer, the deposits are easily polished and compare favorably with products made from rolled gold stock.

Auralloy gold concentrate solutions are available for all gold plating requirements. Any alloy plate so obtained will be known as Auralloy Plate.

PRODUCT LITERATURE

The publications listed in this section may be obtained free upon written request on company letterhead to the manufacturers concerned. Your courtesy in mentioning PRODUCTS FINISHING when requesting copies of these publications will be sincerely appreciated by the manufacturer and the publisher of this magazine.

Abrasive Belt Finishing Bulletin. Behr-Manning Bulletin, Vol. 9, No. 1, published by Behr-Manning, Troy N. Y., describes the application of Resinall Metalite Belts to various industrial finishing operations, and shows how some polishing problems may be solved with the aid of abrasive belt machines.

Metal Cleaning Guide, Oakite Products, Inc., 120 Thames St., New York 6, N. Y., has announced the publication of an illustrated, 44-page booklet, which reviews metal cleaning in all its phases. After considering briefly the wide variety of soils which result from fabricating operations, the booklet discusses specific materials, equipment and procedures for most effective removal of these soils. Clearly and concisely reported upon are the following operations: tank cleaning; machine cleaning; electrocleaning of steel; electrocleaning of brass and other non-ferrous metals; pickling; deoxidizing; bright dipping; pre-paint cleaning and surface preparation by machine, tank and manual methods; steam-detergent cleaning; barrel cleaning; burnishing. The booklet also offers helpful recommendations for improving the effectiveness of metal-cleaning operations in hard water areas; for anti-rust protection of parts in production and during storage; on coolants and lubricants for machining and grinding; on simplified paint stripping methods; and on treating wash water in paint spray booths.

Rubber Glove Catalog 9035. Industrial and acid gloves are pictured and described in a new catalog section issued by The B. F. Goodrich Company, Akron, Ohio, available upon request. Various types are listed, complete specifications are given, and the uses for each kind outlined.

Tack Cloth, available in rolls, bulk, or individual glassine bags, is the topic of a leaflet distributed by the Baughn Chemical Products Co., 7019 N. Ravenswood Ave., Chicago 26, Illinois.

"The Finishing of Zinc Alloy Die Castings," a 52-page booklet prepared and published by The New Jersey Zinc Co., 160 Front St., New York 7, N. Y., contains in as complete form as possible the information necessary for the practical finishing of rolled zinc and die cast zinc alloy parts. Illustrated throughout, the booklet is divided into three sections; Plating; The Lacquering and Finishing of Zinc Surfaces; and The Cronak Process.

Vander Wal-Wagner Spray-Matic. Wagner Bros., Inc., 432 Midland, Detroit 3, Mich., has prepared an illustrated bulletin describing its Spray-Matic, a spray gun mounted in baffles which restrict the lubricating spray to the width of the belt. Also described is its newly-formulated Belt-Life Lubricant which can be applied automatically to wet or dry type belts without interrupting the polishing operation.

For a real good polishing job use

Keystone TURKISH Emery

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KEYSTONE EMERY MILLS *Write for Sample* **4316 Paul St., Phila., Pa.**

Dust Control Folder. How to initiate the 1001 savings stemming from dust control by a simple "wet water" arrangement involving no capital investment, is the story told in a new folder titled "Controlling Dust in Industrial Plants," just released by Aquadyne Corporation, 220 East 42nd Street, New York 17, N. Y. Applications in various industries are described.

"A Simplified Guide to Bakelite and Vinylite Plastics." Bakelite Corp., Unit of Union Carbide and Carbon Corp., 30 E. 42nd St., New York 17, N. Y., has available a 24-page informative booklet which provides data on the forms in which Bakelite and Vinylite Plastics are available, their important properties, and up-to-date listing of their more important applications. Well illustrated throughout, it covers a wide variety of subjects including "Bakelite Resins for Coatings" and "Vinylite Resins for Coatings."

Rubber Processing for Industrial Equipment and Production Parts. Automotive Rubber Co., Inc., 8601 Epworth Blvd., Detroit 4, Mich., has prepared a folder which contains: **Bulletin No. 10, Rubber Lined Diaphragm Tanks; Bulletin No. 20, Sheet Rubber Lined Tanks (Open or Closed); Bulletin No. 40, Rubber Lined Ventilation Systems; Bulletin No. 51, Seamless Rubber Covered Tank Bottom Grids; Bulletin No. 66, Air Agitation System for Acid Solutions; Bulletin No. 70, Insulated Metal Baskets; Bulletin No. 75, Standard Insulated Baskets; Bulletin No. 80, Rack Insulations; Bulletin No. 91, Rubber Lined and Covered Drums; Bulletin No. 100, Rubber Insulated Anode Baskets; Bulletin No. 250, Self-Aligning Rubber Insulated Anode Rod Supports; Bulletin No. 110, Rubber Covered Parts Separators; Bulletin No. 122, Solution Handling Shop Utensils; Bulletin No. 130, Rubber Covered Pipe and Fittings; Bulletin No. 500, Mechanical Rubber Goods; and Bulletin No. 750, Rubber Insulated Metal Parts.**

Sarco Catalogs. Sarco Co., Inc., Empire State Bldg., New York 1, N. Y., has prepared a number of catalogs describing its equipment for improved plating. Available is literature describing the Sarco "LSI" Electric Control (Catalog No. 1025); TR-40 Cooling Control (No. 700); Vapor-Line Control (No. 650); Tank Temperature Controls (No. 600); Thermotons (No. 550); Thermostatic, Bucket and Float-Thermostatic Steam Traps (Nos. 250, 350 and 450); and Pipe Line Strainers (No. 1200).

"Painting with Aluminum" is the title of a comprehensive 32-page brochure for industrial users of aluminum. Distributed by the Aluminum Company of America, 661 Gulf Bldg., Pittsburgh 19, Pa., the booklet emphasizes that uses of aluminum paint by business and industry fall into three classifications: (1) for metal, concrete and masonry and similar non-absorbent surfaces; (2) for weather-exposed wood; and (3) for interior heated surfaces and for decorative uses. Profusely illustrated, the brochure shows proven applications of aluminum paints over the years, ranging from oil refineries to industrial fencing. Several pages are devoted to questions and answers and an aluminum paint coverage table.

Corrosion Resistant Cement Chart. A new, complete chart showing the resistance of both resin and silicate cements to various corrosive chemicals has been issued by the Special Chemicals Department of The Pennsylvania Salt Manufacturing Company, 1000 Widener Building, Philadelphia 7, Pa. Designed as a tool to aid the corrosion resistant masonry construction trade in selecting the proper cement for specific industrial uses, the chart shows the resistance of Pennsalt PRF, Asplit, Causplit, Pennsalt HF, and Penchlor Acid Proof Cement to a list of 259 chemicals and chemical compounds from acetaldehyde to zinc sulfate. The chart is based on reliable tests conducted by Pennsalt.

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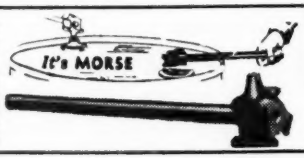
Instantly loosens, tightens 95% all plugs or bungs in steel drums. Has 16" extra-strong steel tubing handle. Wgt. only 2 lbs. Order 1 or more today!



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SATISFACTION GUARANTEED... **$2.60**
Non-sparking type $4.00
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124 Dickerson, Syracuse 2, N.Y.

Durco Corrosion-Resistant Valves are fully discussed and illustrated in Bulletin 610, available from The Duriron Co., Inc., Dayton 1, Ohio.

Manhattan Rubber Lined Pipe. Bulletin No. 6907, describing Manhattan Rubber Lined Pipe for use in industries where there are conditions of corrosion, contamination, abrasion, or flow restricting deposits, has been issued by Raybestos-Manhattan, Inc., Manhattan Rubber Division, Passaic, N. J. Included in the bulletin are engineering data for proper specifications and descriptions of Condor Flexible Rubber Pipe and Condor Acid Hose.

Alemite "Versatal" Pump. Spray application of almost every type of material is covered in a 16-page brochure prepared by the Alemite division of Stewart-Warner Corp., 1826 Diversey Pkwy., Chicago 14, Ill., showing uses of the Alemite "Versatal" pump.

The versatility of the Versatal materials pump is delineated in pictures of actual uses industry has found for it, and over forty materials application problems are covered photographically. Actual examples of economies in materials, labor, product preservation and other advantages are described.

Bulletin On Electrostatic Precipitation. A 16-page, two-color bulletin on electrostatic precipitation, designated as GEA-5212, has been announced as available from the General Electric Co., Schenectady 5, New York.

Profusely illustrated with photographs and diagrams, the publication explains how electrostatic precipitation works, gives case histories of seven typical installations where the system is being used, and describes the various methods of electrostatic precipitation and the electric equipment applicable to each method.

Recognized as the most efficient method known today for the control of small particles of matter, either liquid or solid, electrostatic precipitation is used for air cleaning, gas cleaning and recovery, painting, deposition, orientation, and separation. It can collect cigarette-smoke particles as small as 1/100,000 of an inch in diameter, or deposit fibers as long as ¼ inch on an adhesive-coated cloth to make pile rugs. It is finding application in acid plants, blast furnaces, carbon-black plants, cement plants, gas plants, oil refineries, power plants, pulp and paper mills, smelters, textile mills, and elsewhere.

Oakite Pre-Paint Cleaner. How a new pre-paint metal cleaning material, Oakite Compound No. 33, removes oil and rust and prepares metal for paint in a single procedure is described in a special Service Report issued by Oakite Products, Inc., 120 Thames St., New York 6, New York.

"Tape Is A Tool" is the title of a 12-page pocket-size catalog, available from Polyken Industrial Tape, 222 W. Adams St., Chicago 6, Ill., intended as a guide for engineers, production and maintenance men, and purchasers and users of industrial tape. The catalog lists dozens of individual Polyken tapes, their specifications, and uses. Actual sample strips of the many tapes are precisely reproduced with magnified sections which show construction details.

Randolph Fire Hazard Index. Especially interesting to safety engineers, plant managers, and maintenance men is the 36-page pocket-sized Fire Hazard Index published by Randolph Laboratories, Inc., 8 E. Kinzie St., Chicago 11, Ill. Listed in quick-reference, alphabetical order are over 590 chemical, gas, and common fire hazard materials and their proper fire-fighting agents, as recommended by the Board of Fire Underwriters and the National Fire Protection

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Oregon 5-0094
5-0095

Association. Also contained in the booklet are basic facts about the principles of fire fighting in illustrated and graphic form.

Cadmium Brightener. A seven-page bulletin describing Rohco 20XL Cadium Brightener Electroplating Process is available by writing R. O. Hull & Company, Inc., Dept. X4, 1273 West 3rd Street, Cleveland 13, Ohio.

The bulletin describes the advantages obtained through the use of Rohco 20XL Cadmium Brightener, such as unusual uniformity of deposit thickness; exceptional brilliance of deposit over the widest bright current density plating range; maximum production from barrel units; easy control through unusually wide latitude of operable concentration range; economical usage through improved throwing power, higher production and reduced rejects.

M-S-A Portable "Samplair" for accurate, on-the-spot analyses of atmospheric concentrations of chromic acid mist is described in full in an illustrated Bulletin No. CT-8 which may be secured from the Mine Safety Appliances Co., Braddock, Thomas and Meade Sts., Pittsburgh 8, Pennsylvania.

Surface Active Agents. Two non-ionic type surface active agents designed principally for industrial use are described in detail in Technical Bulletin No. P-136 available from Monsanto Chemical Company, Phosphate Division, St. Louis 4, Missouri.

They are Sterox No. 5 and Sterox No. 6, both polyoxyethylene thioethers. Both are compatible with anionic and cationic type detergents and effective in hard water or in the presence of metallic salts.

The five-page bulletin includes data on chemical and physical properties, solubility and surface tension. Suggested applications in textile and metal cleaning operations are given.

Surety Glove Selector, a quick guide to the right glove material for each operation, can be obtained from The Surety Rubber Co., Dept. P, Carrollton, Ohio.

Industrial Unit Spray-Washer, product of Industrial Filter & Pump Co., 1625 W. Carroll Ave., Chicago 12, Ill., is the subject of a catalog page, which presents a full description of the unit together with specifications.

Oakite Steam Gun. Oakite Products, Inc., 120 Thames St., New York 6, N. Y., has prepared Folder F7338 which provides illustrations and complete specifications of its Steam Gun.

Nialk Trichlorethylene, for rapid, thorough cleaning of all types of metal parts, ferrous and non-ferrous, by the vapor method, is the subject of a six-page pocket-size folder released by the Niagara Alkali Co., 60 E. 42nd St., New York 17, New York.

New York Blower General, Industrial, and Heat Fans, for dust and gas removal, conveying of materials, and handling of hot air and gases in industrial processes, are the subject of Bulletin 482 issued by The New York Blower Co., 32nd & Shields Ave., Chicago 16, Illinois.

Barnstead Demineralizer Catalog 123. Barnstead Still & Sterilizer Co., 130 Lanesville Terrace, Forest Hills, Boston 31, Mass., has issued a comprehensive catalog which describes in detail the difference between distilled and demineralized water. The 20-page catalog highlights the advantages of either distilled water or demineralized water as used in manufacturing and processing opera-

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Dealers and jobbers wanted

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tions which call for pure water, and shows how ion-exchange purification works.

It also cites case histories on quality control of water that have resulted in better products, uniform results, fewer rejects, and the reduction of costs in plant operations.

Aminco Bulletin 2176, providing details on its Humidity-Temperature Test Apparatus with Program Control, can be obtained from the American Instrument Co., Inc., 8030 Georgia Ave., Silver Spring, Maryland.

Vanott Polishing and Buffing Machines. Models V-1, V-4, and V-8 are illustrated and described in a six-page brochure available from the Vanott Machine Corp., 222 Colgate Ave., Buffalo 20, New York.

Dampney Vinyl Coating. Specifications, characteristics, and applications of this coating, for use on metal over a wide range of operating conditions, are given in Bulletin 1560 issued by The Dampney Company of America, Hyde Park, Boston 36, Massachusetts.

NEW BOOKS

Industrial Waste Disposal. Published by Franklyn Roberts, 3288 W. Boston Blvd., Detroit 6, Mich. 80 pages, 8½ x 11 inches. Illustrated. Price, $3.00.

A compilation of authentic articles on the vital problem of industrial waste disposal, written by leading chemical engineers and consultants, the book contains numerous charts and formulas. Illustrated and described are ways in which some plants have already solved their waste disposal problems, and, in some cases, have turned waste material into profitable by-products.

Included in the book are the Federal Water Pollution Act No. 845; several state laws, and a typical city ordinance.

A.S.T.M. Standards on Paint, Varnish, Lacquer, and Related Products. Published by the American Society for Testing Materials, 1916 Race St., Philadelphia 3, Pa. 680 pages. Illustrated. Paper covers. Price, $4.85.

Prepared by A.S.T.M. Committee D-1 on Paint, Varnish, Lacquer, and Related Products, this book presents more than 190 specifications, tests, and definitions in their latest form. Specifications, test methods, and chemical analysis of pigments cover: white, black, mineral iron oxide, blue, green, yellow and orange, red, metallic, non-hiding, and miscellaneous. General test methods for pigments include alkalinity or acidity, bleeding, coarse particles, moisture, oil absorption, gravity, tinting strength and mass color of color pigments, water in petroleum products and other bituminous materials, and pH of aqueous solutions with the glass electrode.

There are specifications, test methods, and definitions of terms relating to drying oils, paint driers, thinners, shellac, varnish, and varnish materials; also, a section on traffic paint, paint weathering tests, and general paint tests. Other standards cover putty, rosin, liquid naval stores, and so on. New material includes some 24 tests and specifications not published in previous compilations.

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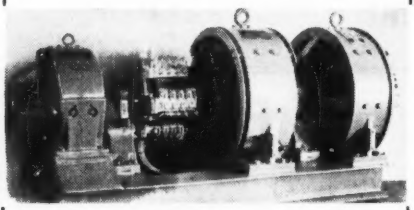

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Opportunity Section

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Manufacturer of industrial vapor degreasers, metal parts washers, dryers and degreasing solvents. Only men experienced in metal cleaning need apply. Salary plus commission. Our employees know of this ad. Box No. 51, c/o Products Finishing, 431 Main St., Cincinnati 2, Ohio.

WANTED: Manufacturers' agents in certain areas to sell McKEON'S Zinc-Brite world's newest cleansing and purifying agent for zinc plating solutions. Free samples and unlimited cooperation. Sulphur Products Co., Greensburg 6, Pa.

Sales Engineers—To sell first class foreign made felt wheels and bobs on commission basis. No objection to allied lines if not conflicting. Write Box No. 56, c/o Products Finishing, 431 Main St., Cincinnati 2, Ohio.

A well established West Tennessee corporation, $100,000.00 authorized capital, offers the opportunity to a zinc, bright nickel, copper and cad plater, who would like to invest $5,000.00 to $10,000.00 and manage plating plant. Box No. 52, c/o Products Finishing, 431 Main Street, Cincinnati 2, Ohio.

Will BUY your dirty THINNERS and SOLVENTS. Send sample or letter giving approximate contents and sclids. The Johann Company, 633 East 138th Street, Dolton, Illinois.

For sale as going business. U. S. Plating Co., St. Paul, Minn. Lewis E. Solomon, trustee in bankruptcy, 614 Pioneer Bldg., St. Paul, Minn.

All plating solutions analyzed for $1.50 each. 24 hour service. Reagent solutions also sold at $1.00 per quart.

PLATERS' LABORATORY SERVICE
648 Jackson Ave., Elizabeth, New Jersey
Elizabeth 2-8608

Salesman for lacquers and enamels by national manufacturer for Philadelphia territory. Write Box No. 57, c/o Products Finishing, 431 Main Street, Cincinnati 2, Ohio.

Selenium Rectifier. Rapid Electric Co., 2847 Middletown Rd., Bronx 61, N. Y., has a data sheet describing its series of 150-ampere rectifiers with output voltages in the range of 0-12. Some models include variable output controls, and all are complete, ready for operation, with ammeter and voltmeter.

H-VW-M Cleaners, their application and advantages, are discussed in Bulletin C-106, issued by the Hanson-Van Winkle-Munning Co., Matawan, New Jersey.

Poly-pale Resin. A booklet describing the uses of Poly-pale Resin in protective coatings has been published by Hercules Powder Co., Wilmington, Del. The booklet includes a table of typical physical and chemical properties of the resin, as well as a listing of its general properties.

Up-to-date information is provided on its use in esters, maleic-modified and phenolic-modified resins, and in varnishes, metal resinates, gloss oils, tung oil varnishes, and tung oil limed rosin varnishes.

The Finishing Touch **By J. A. Patterson**

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Bakelite Review. To observe its 40th year, Bakelite Division, Union Carbide and Carbon Corp., 300 Madison Ave., New York 17, N. Y., has prepared a special edition of "Bakelite Review" which cites examples of the important roles plastics have played in development of many 20th century industries. Photographs also show the extensive Bakelite plant facilities and intricate equipment required for the large-scale production of quality plastics. The publication concludes with a summary of the major developments in Bakelite and Vinylite plastics during 1949.

Chelsea Products. Chelsea Fan & Blower Co., Inc., 1206 Grove St., Irvington 11, N. J., has prepared an illustrated catalog giving full engineering information, dimensions, performance, and prices regarding all types and sizes of its fans for industrial, commercial, and residential applications. Included is informaiton on direct drive or belt-driven window fans, industrial pressure fans, mancoolers, pH units, duct booster fans, and various fans of all kinds and descriptions, together with a complete line of automatic counter-balanced shutters for all applications.

Catalogs

FOR YOUR LIBRARY

To obtain copies of the catalogs listed here, indicate on the coupon the number of the item in which you are interested and mail as directed.

1. Nylon Anode Bags
Enthone, Inc., New Haven, Conn., has published a bulletin on its Nylon Anode Bags for nickel, copper, silver, and other plating solutions.

2. Acid-Proof Construction
A catalog discussing its complete facilities for designing, engineering, material selection, erection and maintenance of acid-proof construction for all industries is available from Chemsteel Construction Co., Inc., Pittsburgh, Pennsylvania.

3. Black Finishes
A "Black Book" describing details of Zinc Black and other Black-Magic metal finishes has been published by the Mitchell-Bradford Chemical Co., Stratford, Bridgeport, Connecticut.

4. Tank Rheostats
Bulletin No. TRA-526 providing complete details on its tank rheostats can be obtained from the Hanson-Van Winkle-Munning Co., Matawan, New Jersey.

5. Plating Rack Paste Insulation
The Nelson J. Quinn Co., Toledo 7, Ohio, has available a folder descriptive of Bunatol 1002, a paste insulation designed to insulate hooks, fixtures, jigs, baskets, grids, and racks used in plating, its application and use.

6. Backstand Belts
"Facts About Backstand-Belt Grinding and Polishing" are enumerated in a booklet being distributed by Armour & Co., Chicago 9, Illinois.

7. Aluminum Finishes
A 64-page manual entitled "Finishes for Alcoa Aluminum" is available from the Aluminum Company of America, Pittsburgh 19, Pennsylvania.

8. Grinding and Polishing Equipment
Specifications and operating data of its complete line of grinders, polishers, buffers, and speed lathes are included in Catalog No. 44 prepared by the Standard Electrical Tool Co., Cincinnati 4, Ohio.

9. Infra-Red Brochure
The Fostoria Pressed Steel Corp., Fostoria, Ohio, has published Brochure EV-1146 which illustrates and describes the use of the Fostoria Evenray System in industrial heating applications.

10. Scratch Brushes
Dixrip Fine Wire Scratch Brushes for all industrial purposes are described and illustrated in a catalog and price list available from Dixon & Rippel, Inc., Kingston, New York.

11. Gold Plating
An instruction booklet describing gold coloring solutions for various shades of gold is now being issued by Baker & Co., Inc., Newark, New Jersey.

12. Felt Polishing Wheels and Accessories
Bacon Felt Co., Winchester, Mass., has an illustrated brochure listing its complete line of felt polishing wheels, bobs, sheets, hair felt, and marble buffers, together with specifications and suggested applications.

13. General Purpose Fans
"General Purpose Fans" is the title of an eight-page bulletin designated as Bulletin 491 distributed by the New York Blower Co., Chicago 16, Illinois.

14. Flock Color Card
A color card containing samples of flock finishes has been issued by the Rayon Processing Company of Rhode Island, Inc., Central Falls, Rhode Island.

15. Metal Lacquers
"Is There A Better Metal Finish Than The One You Now Use?" is a booklet issued by The Egyptian Lacquer Mfg. Co., Newark, N. J., describing six clear lacquers for metal.

16. Chemifinishes
General information concerning the finishing of metals with Du-Lite materials is contained in literature prepared by The Du-Lite Chemical Corp., Middletown, Connecticut.

17. Electric Radiant Heaters

The Edwin L. Wiegand Co., Pittsburgh 8, Pa., has available Bulletin CS-603 which describes the construction of Chromalox heaters and lists the uses, operating characteristics, and advantages of the infra-red units.

18. Temperature Controls

Self-operated temperature controls for plating and finishing applications are described in Catalog No. 600 available from the Sarco Co., Inc., New York 1, New York.

19. Deburring and Finishing Equipment

"Cut Labor Costs ½ or More" is the title of a bulletin issued by Almco, Division of Queen Stove Works, Inc., Albert Lea, Minn., describing the complete line of Supersheen deburring and finishing barrels, equipment, and supplies.

20. Striplastic No. 320

A bulletin describing the properties and applications of Striplastic No. 320 is available from the Striplastic Co., Cleveland 6, Ohio.

21. Cleaning and Phosphatizing

Four convenient reference file folders under the headings of Paint Removal, Phosphate Coatings, Metal Cleaning, and Spray Booth Maintenance, which contain descriptions of the complete line of various compounds and chemicals available from the company, can be obtained from Klem Chemicals, Inc., Dearborn, Michigan.

22. Unichrome Coating 203

Instructions for the use of Unichrome Air-Dry Rack Coating 203, an improved coating material developed by United Chromium, Inc., New York, N. Y., for insulating plating and anodizing racks, are available in U. C. I. Bulletin 203.

23. Finishing Equipment

The Despatch Oven Co., Minneapolis 14, Minn., has prepared Bulletin C-51 which illustrates and describes its complete line of gas-oil, electric, and steam finishing equipment.

24. Iridite Alcote

Allied Research Products, Inc., Baltimore, Md., has available a folder describing its Iridite Alcote, a chromate type, corrosion resistant finish for aluminum.

25. Semi-Automatic Polishing and Buffing Machines

Acme Mfg. Co., Detroit, Mich., has available a 20-page two-color bulletin including descriptions and illustrations of its Semi-Automatic Polishing and Buffing Machines, together with line drawings and complete specifications.

26. Cowles SO Cleaner

"Buffing Compound Removal Was A Tough Job!" is the title of a booklet describing the characteristics and advantages of Cowles SO Cleaner, product of Cowles Chemical Co., Cleveland, Ohio.

27. Abrasive Grain

The Simonds Abrasive Co., Philadelphia 37, Pa., is issuing an illustrated data sheet on "Borolon" Aluminum Oxide Abrasive Grain for the polishing trade and general industrial uses.

28. Activated Carbon

The use of activated carbon for decolorizing, purifying, and deodorizing various liquids and electroplating solutions is described in literature available from the Darco Corp., New York 17, New York.

29. Spray Painting Information

"Hints on Finishing Economies," a 20-page booklet prepared by E. I. du Pont de Nemours & Co., Finishes Div., Wilmington 98, Del., covers the following subjects: proper paint temperature, correct air and fluid pressures, importance of paint viscosity, gun adjustment for correct spray pattern, proper handling and triggering of the spray gun, uniformity and thickness of the paint film, and causes and cures of common imperfections in spray finishing.

30. Boothcote Circular

A circular describing the use of Boothcote, a spray booth coating, is available from the Hygrade Food Products Corp., Boothcote Division, Buffalo 6, New York.

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I am interested in receiving the following literature reviewed in your May Issue.

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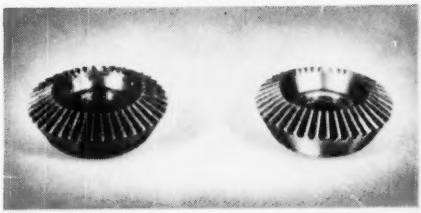

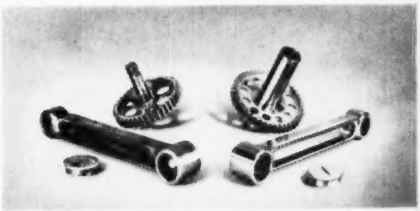

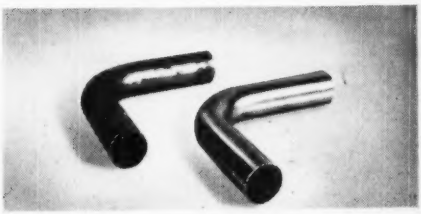

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